



Shaping the Mobile Multimedia Future –

AN EXTENDED VISION FROM THE UMTS FORUM

REPORT NO. 10

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Report from the UMTS Forum

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This report is produced by the UMTS Forum, an association of telecommunications Operators, manufacturers and Regulators as well as IT- and media industries interested in broadband mobile multimedia who are active both in Europe and other parts of the world and who share the vision of UMTS. The National Administrations that are members of the Forum have actively supported the development of this report as well. However, the views and conclusions expressed in this report do not necessarily represent the views of the National Administrations. Therefore the Administrations cannot be bound by the detailed recommendations contained in the report. In terms of a technology platform UMTS will move mobile communications forward from where we are today into the Information Society of third generation services, and will deliver speech, data, pictures, graphics, video communication and other wideband information direct to people on the move. UMTS is a member of the IMT-2000 family of standards.

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0.1 EXECUTIVE SUMMARY

0.1.1 Background

This report seeks to describe UMTS, conceived as a mobile multimedia system, in the context of the future developments in telecommunications, information technology (IT) and media, which together will combine to deliver the Information Society. Today's concept of separate mobile and fixed telecommunications networks is not sufficient to explain the realities of tomorrow's business environment. A clear focus should be kept on the potential of UMTS to embrace new technologies, concepts and services. Elements of this vision are:

- The gradual convergence of telecommunications, IT and media, working to bring about global opportunities for businesses and consumers, while creating new ways of doing business, entertaining and informing.
- New ways for individual users to manage and control vast amounts of information from many diverse sources in order to fulfil their own objectives and interests. This will represent a very large and new personalised market that cannot be satisfied using existing concepts of service provision.
- New entities in the future converged market, such as content providers, Internet service providers, and virtual mobile network operators, will emerge as means of delivering information to the users in the market. Many services are likely to emerge from today's Internet but will be able to cover subscription as well as non-subscription services. Such services will also extend to cover corporate Intranets where information is managed and delivered to closed user groups on an organisational or interest basis.
- Personalised mobile multimedia services that will become commonplace in the future service offerings.
- A trading revolution that is taking place on the Internet as businesses form electronic communities to streamline their supply chains and procurement procedures. There will be "e-marketplaces" for industries as well as specialised sectors. On line trade will drive mobile commerce. The development of mobile, Internet-based electronic payment will enable this business.

0.1.2 New Players in a Changing Value Chain

This report analyses the elements of the value chain in order to allow the UMTS industry and regulators to better understand the evolution in the mobile multimedia services market over the next ten years. At present, the mobile network value chain is centred around the network operator who captures more than 90 per cent of market revenues, dominated by income from voice-based services. It is widely recognised, however, that advancing technology, growth of Internet services and new end-user demands are challenging this traditional value chain.

The new, fast changing value chain will have new players and entities, and many network operators are already adopting new business strategies to broaden their role and to defend their competitive position. The multimedia service provider will be one of the key players in the multimedia value chain. Revenues will increasingly be diverted to other market players than the traditional.

0.1.3 New Advanced Services

The new business opportunities with UMTS are adding new market segments to the existing and traditional telecommunications market. UMTS will offer new opportunities for service provision, such as

- fast mobile multimedia capabilities,
- location,
- service portability,
- personalised and ubiquitous communication capabilities

The question arises which services will result from UMTS. A single “killer” application clearly does not and will not exist. Many services, although they may start with 2G will become more affordable using 3G. Services that already exist will be greatly improved with location, interactivity and mobile multimedia, with customer segmentation based on lifestyle management. The demand for increased personal productivity will also be of importance. The blurring of boundaries between business and consumer markets, and between work and home, will continue.

0.1.4 Mobile Multimedia Portals

The convergence point for supply of information and entertainment, and the demand from the end users, will be the Mobile Multimedia Portal. As the end-user's preferred point of entry into all IP-based services and content, the portal is where the customer interacts with the entity that provides the services. The portal presents a huge market opportunity for strong customer relationships that are essential to competitive success in the new Internet-enabled environment.

Whereas traditional fixed portals are designed to provide a mechanism to organise information delivery to specific market segments, the mobile portal will be oriented towards individual users to reflect their needs of secure and robust access in changing locations and

circumstances. Using an intelligent IP-access platform with dynamic service-selection capabilities, the portal owner can provide personalised location-dependent services that are tailored to the mobile users' individual requirements and choices. This type of personalised portal allows the customer to select, subscribe to and configure all type of services.

The Mobile Multimedia Portal is not restricted, as the traditional portal, to the Internet itself. Instead, it operates on a higher level in the control chain, providing access to and selection of all IP-based services, including, of course, the World Wide Web. Other services, which will be managed by the portal, come from audio and TV-media providers, application service providers (ASP), yellow pages, advertising companies and from the portal owner itself. For the customer the portal will be a personalised home page, which has the potential to greatly reduce customer churn. Partnering with organisations having an established brand can help the portal owner to deliver value-added services under its own brand to the customers.

0.1.5 Standardisation

The wireless access has already introduced a new set of standards and protocols that add a layer of complication to applications not necessarily compatible with the Internet world. For UMTS these standards have to be supplemented for those services that will be offered also on the wireline network. Also the harmonisation of the terminal interworking characteristics between wireless and wireline terminals may be a standardisation issue. The standardisation furthermore has to specify impacts regarding addressing, which is quite different in telecommunications and the IP world.

The harmonisation of the UMTS standards in the IMT-2000 framework with the standards on the Internet side is necessary to make the Mobile Multimedia Portal a workable solution in an international networking environment, especially for the roaming user. The role of the UMTS Forum is to widen the scope in the standardisation and to convert its views into requirements and work items.

0.1.6 Regulation in a Convergent Environment

At present, in most countries of the world, the telecommunications, broadcasting and IT sectors (i. e. vertically independent sectors) are regulated separately. In a converged environment the question arises whether this approach is well suited to foster competition, innovation, consumer interests and the provision of services. A more horizontal approach seems to be more suitable whereby all sectors have the same infrastructure regulation, which is technology and sector neutral and relying upon competition law, to prevent parties abusing their dominant position in provision of services.

Wherever regulation is in place, it must be applied in a workable and timely manner. The global nature of IMT-2000/UMTS combined with sector convergence points to potential difficulties of enforcing the rules of one country in other countries. Furthermore the rapid pace of change in terms of services and products, measured in months and weeks, presents a real challenge for anyone seeking a legislative solution to any particular problem.

Pragmatic international solutions need to be sought.

0.1.7 New Business Strategies

When discussing potential business relationships in the converged market, various models can be considered, comprising the roles of i.a. the Network Operator, the Internet Service Provider, the Portal Operator and the Content Provider.

- ***The fragmented model***, in which the business roles are kept by separate market players. The task of offering the end-user a coherent service package and simple commercial interfaces may be difficult to fulfil.
- ***The partnership model***, in which the market players having the main roles mentioned above are co-operating in an organised way. Competition issues will be important in this model.
- ***The ownership model***, in which the main roles are owned by one organisation. The responsibility for providing end-user services will be clear, but sufficient competition has to be maintained. This model has to allow additional partnership and/or additional service offerings from independent providers, e. g. end-user access to other portals and other content providers.

There are two major groups interested in Mobile Multimedia Portals: those who provide network access, i. e. network operators, and those who execute transactions. For both groups, the same factors – reach, richness and affiliation - are important when it comes to marketing the Portal. Network operators can be very strong in at least two of these dimensions – reach and affiliation – and are therefore well positioned in the portal industry. The third dimension – richness – has then to be covered by alliances with content aggregators.

The traditional elements that were billed in the world of telecommunications become irrelevant. Time dependent billing on the network is already fading and will disappear quickly as customers get used to the idea that connections are ‘always on’. Distance will disappear quickly, too – IP addresses are always local.

The billing will be based on availability, data type or volume. The key to an efficient billing process will be flexibility.

The real opportunity for service providers will be to take their place in the value chain of m-commerce, and in return for billing and supporting the customers receive a percentage of revenues of the products and services bought. In addition, there is the opportunity to act as a wholesale agent for content providers.

There will not be one business model but a number of different unique models. As the value chain evolves and gets more complicated, many new players are expected to materialise, such as Information Brokers, Information Integrators and Application Developers.

0.1.8 Conclusions

UMTS is much more than Internet or wireless communications. The vision of UMTS is a heterogeneous network environment with fast changes of concepts and businesses, where various organisations play different roles in the value chain. Mobile operators are well positioned to exploit the many new opportunities afforded by the introduction of 3G mobile multimedia services from 2001/2002, but a host of new players in the market will compete for the customers.

UMTS will continue to develop and add value, enabling players to grow their Mobile Multimedia businesses to 2010 and beyond. New opportunities for service providers and content providers to generate value will be created, by intensified support for personalisation, location, interactivity, the operational and transacting environment, and m-commerce. The Mobile Multimedia Portal will be one key element in the interface towards the customers, which will give its owner a competitive advantage in the new converged market.

0.1.9 Recommendations

Rec #	Recommendation	Reference Section
1	The UMTS Operator should take up the new business opportunities via partnering with ISP, Portal Content Providers or consider them in one ownership.	7.
2	Operators have the opportunity to move up the value chain: <ul style="list-style-type: none"> • In a stepwise approach towards "All IP" transport and switching, following 3GPP Rel. 99, Rel. 00 and further Releases towards HTML-DHTML-XML transparent solutions. • By accessing content via a Mobile Multimedia Portal Platform. 	5.
3	Harmonised timely introduction of " <i>service portability</i> " in conjunction with a Mobile Multimedia Portal platform will enable personalised content management. Functional blocks of the Mobile Multimedia Portal platform and its phased introduction should follow a harmonised milestone plan.	4.3.1 4.2.1 (3.1)
4	Early clarification of address reservation and structuring is vital to the success of UMTS/IMT-2000. Timely advanced planning of Internet Domain Names, IP-addresses and E.164 addresses is of importance for the industry in order to ensure an early clarification of address reservation and structuring.	4.6
5	Any regulation should be kept to the minimum necessary to achieve the desired effect. International solutions to regulatory problems should be sought. The regulatory framework should allow public service broadcasters and programme makers to take advantage of the new opportunities offered by the technological convergence in a commercial framework and in competition with other market players. However, such commercial activities must be kept strictly separated from state-subsidised activities.	6.3
6	Individuals should be allowed to carry IMT-2000/UMTS mobile terminals with them all around the world without any restrictions when crossing borders, such as customs duties or individual	6.6.1

	licences, and to use them, subject to normal connection requirements. Such mobile terminals shall of course comply with internationally accepted rules concerning interference, health and safety.	
7	3GPP should take up investigations and define UMTS solutions for <ul style="list-style-type: none">• IPv4/v6 co-existence and integration with IPv6• QoS control, applications-dependent• IP-security combined with USIM• Mobility management/roaming for information services (IP-based).	5.1
8	All players should work to achieve global acceptance of the principle of Suppliers Declaration of Conformance to mutually agreed requirements. This will simplify the placing on the market of future multi-mode terminals.	6.6.3

0.2 RESUME

0.2.1 Contexte

Ce rapport vise à décrire l'UMTS, conçu comme un système multimédia mobile, en tenant compte des développements futurs des télécommunications, des technologies de l'information (TI) et des médias qui, par leur combinaison, engendreront la Société de l'Information. Le concept actuel de réseaux mobiles et fixes séparés ne suffit pas pour expliquer les réalités de l'environnement professionnel de demain. Une attention particulière serait à maintenir sur le potentiel de l'UMTS à incorporer de nouvelles technologies, de nouveaux concepts et services. Des éléments de cette vision sont :

- La convergence progressive des télécommunications, TI et médias, oeuvrant à faire naître des opportunités globales pour les entreprises et les consommateurs, tout en créant de nouvelles façons de faire des affaires, de se distraire et de s'informer.
- De nouvelles manières pour les individus de gérer et de maîtriser de grandes quantités d'information de sources diverses, en vue de satisfaire leurs propres objectifs et intérêts. Ceci représentera un nouveau marché personnalisé et très large qui ne peut être satisfait en utilisant les concepts actuels d'offre de services.
- Dans le futur marché convergent, de nouveaux intervenants, tels que fournisseurs de contenu, fournisseurs de service Internet et opérateurs virtuels de réseau mobile, vont apparaître pour fournir l'information aux usagers. Beaucoup de services vont probablement être issus du monde Internet d'aujourd'hui, mais ils couvriront les deux catégories avec ou sans abonnement. Il y aura aussi extension vers les services d'Intranet d'entreprise où l'information est gérée par et fournie à des groupes fermés d'usagers, appartenant à une même organisation ou ayant des intérêts communs.
- Des services multimédias mobiles personnalisés qui deviendront monnaie courante dans les futures offres de service.
- Une révolution du monde du commerce qui intervient sur l'Internet dans la mesure où des entreprises forment des communautés "électroniques" pour rationaliser leurs chaînes d'approvisionnement et leurs procédures d'achat. Il y aura des "e-places de marché" tant pour l'industrie que pour des secteurs spécialisés. Le commerce en ligne dirigera le commerce mobile. Le développement du paiement électronique mobile basé sur l'Internet permettra cette activité.

0.2.2 De nouveaux acteurs dans une chaîne de valeur qui change

Ce rapport analyse les éléments de la chaîne de valeur afin de permettre au secteur de l'UMTS et aux régulateurs de mieux comprendre l'évolution du marché des services multimédias mobiles dans les dix prochaines années. Actuellement, la chaîne de valeur des réseaux mobiles est centrée sur les opérateurs de réseau qui accaparent plus de 90 % du chiffre d'affaires, majoritairement fourni par la facturation des services de voix. Il est

cependant largement reconnu que le progrès technologique, la croissance des services Internet et les nouvelles demandes des utilisateurs vont faire évoluer cette chaîne de valeur.

La nouvelle chaîne de valeur, qui évolue rapidement, comprendra de nouveaux acteurs et de nouvelles entités; de nombreux opérateurs de réseau sont déjà en train d'adopter de nouvelles stratégies vis à vis du secteur pour élargir leur rôle et protéger leur position concurrentielle. Le fournisseur de service multimédia sera l'un des acteurs-clé dans la chaîne de valeur multimédia. Les revenus seront de plus en plus redistribués vers des acteurs du marché autres que les acteurs traditionnels.

0.2.3 De nouveaux services supérieurs

Les nouvelles opportunités d'affaires dues à l'UMTS ajouteront de nouveaux segments de marché à ceux du marché actuel et traditionnel des télécommunications. L'UMTS offrira de nouvelles opportunités d'offre de services telles que :

- des capacités mobiles multimédias rapides,
- la localisation,
- la portabilité de service,
- des capacités de communication personnalisées apportant l'ubiquité

La question se pose concernant les services qui résulteront de l'UMTS. Une simple application surpassant toutes les autres n'existe pas et n'existera manifestement pas. Beaucoup de services, bien qu'ils puissent commencer avec la deuxième génération (2G), seront mieux offerts par utilisation de la troisième génération (3G). Les services existants déjà seront beaucoup améliorés avec la localisation, l'interactivité et le multimédia mobile, permettant une segmentation des usagers prenant en compte les styles de vie. La demande d'une productivité personnelle plus grande sera aussi très importante. Les frontières entre les marchés professionnel et grand public, entre le lieu de travail et la maison, continueront de s'estomper.

0.2.4 Les Portails Multimédias Mobiles

Le point de convergence entre la fourniture d'information, de distraction et la demande des utilisateurs finaux sera le Portail Multimédia Mobile. En tant que point d'entrée préféré de l'utilisateur final dans le monde des services et contenus basé sur l'Internet, le portail est le lieu d'interaction entre le client et l'entité qui fournit les services. Le portail est une formidable opportunité du marché pour de fortes relations avec le client, élément essentiel pour la réussite concurrentielle dans le nouvel environnement permis par Internet.

Tandis que les portails traditionnels du réseau fixe sont conçus pour offrir un mécanisme organisant la fourniture d'information à des segments de marché spécifiques, le portail mobile sera plus orienté vers des usagers individuels, prenant en compte leurs besoins d'accès sécurisé et fiable, avec des localisations et circonstances qui changent. Par utilisation d'une plate-forme intelligente avec accès Internet, ayant des capacités dynamiques de sélection de service, le propriétaire du portail peut fournir des services personnalisés, fonction de la localisation de l'utilisateur et adaptés aux besoins et choix

individuels de l'utilisateur mobile. Ce type de portail personnalisé permet au client de sélectionner, souscrire et configurer toutes sortes de services.

Le Portail Multimédia Mobile n'est pas limité, comme le portail traditionnel, à l'Internet. Au contraire, il intervient à un niveau plus élevé dans la chaîne de contrôle; il fournit l'accès à tous les services à base d'Internet et permet leur sélection, ceux-ci comprenant bien évidemment la "toile" (WWW). D'autres services qui seront gérés par le portail viendront des fournisseurs de médias télévisuels et audio, des fournisseurs de services applicatifs, des pages jaunes, des sociétés publicitaires et du propriétaire du portail lui-même. Pour le client, le portail sera une page propre personnalisée, ce qui peut potentiellement réduire fortement sa propension à changer de fournisseur. L'établissement de partenariats avec des organisations possédant une marque forte peut aider le propriétaire de portail à fournir aux clients des services à valeur ajoutée sous sa propre marque.

0.2.5 Normalisation

L'accès sans fil a déjà introduit un nouveau jeu de normes et protocoles qui ajoute une couche de complexité aux applications, ce qui n'est pas nécessairement compatible avec le monde Internet. Dans le cas de l'UMTS, ces normes s'ajoutent pour les services qui seront offerts aussi sur le réseau filaire. En conséquence, l'harmonisation des caractéristiques d'interfonctionnement entre les terminaux fixes et mobiles est sans doute sujet à normalisation. Il y a lieu aussi de spécifier les impacts sur l'adressage qui est très différent en télécommunication, comparé au monde Internet.

L'harmonisation des normes UMTS dans le cadre IMT-2000 avec les normes du côté Internet est nécessaire pour rendre opérationnel le Portail Multimédia Mobile dans un environnement de réseaux internationaux, tout particulièrement pour les utilisateurs itinérants. Le rôle du Forum UMTS est d'élargir le champ de la normalisation et de traduire ses visions en exigences et thèmes de travail.

0.2.6 Réglementation dans un Environnement qui converge

Actuellement, dans la plupart des pays du monde, les secteurs des télécommunications, de la diffusion et des TI (c'est à dire secteurs verticaux indépendants) sont réglementés de manière séparée. Dans un environnement qui converge, la question se pose si cette approche est adaptée à la promotion de la concurrence, de l'innovation et de l'offre de services. Une approche plus horizontale semble meilleure, par laquelle tous les secteurs auraient la même réglementation pour les infrastructures, qui est neutre du point de vue de la technologie et des secteurs, et qui s'appuie sur la loi de la concurrence pour empêcher les parties d'abuser de leurs positions dominantes dans l'offre de services.

Là où la réglementation existe, elle doit être appliquée de manière opérationnelle et à temps. La nature globale de l'IMT-2000 / UMTS, associée à la convergence des secteurs, soulève des difficultés potentielles pour imposer les règles d'un pays dans les autres. De plus, la vitesse rapide de changement en terme de services et produits, qui se mesure en mois et semaines, présente un réel défi pour quiconque cherche une solution législative à tout problème particulier.

Des solutions pragmatiques internationales doivent être trouvées et, à l'image du vécu du monde Internet, l'auto-réglementation peut être utilisée comme moyen de traiter certaines pratiques, telles que les contenus illégaux et dommageables.

0.2.7 Nouvelles Stratégies d'affaires

Quand on discute des relations d'affaires potentielles dans le marché convergent, des modèles divers peuvent être considérés qui comprennent les rôles par exemple d'opérateur de réseau, de fournisseur de service Internet, d'opérateur de portail et de fournisseur de contenu.

- **Le modèle fragmenté**, dans lequel les rôles sont tenus par des acteurs séparés du marché. La tâche consistant à fournir à l'utilisateur final un ensemble cohérent de services et des interfaces commerciales simples peut être difficile.
- **Le modèle partenarial**, dans lequel les acteurs du marché s'occupant des rôles principaux mentionnés ci-dessus coopèrent de manière organisée. Les aspects de concurrence seront importants dans ce cas.
- **Le modèle "propriétaire"**, dans lequel les rôles principaux sont tenus par une organisation. La responsabilité dans la fourniture des services à l'utilisateur final est claire, mais une concurrence suffisante sera à maintenir. Ce modèle devra permettre en addition des partenariats et/ou des offres de services par des fournisseurs indépendants, par exemple l'accès par le client final à d'autres portails et à d'autres fournisseurs de contenu.

Il y a deux groupes principaux qui sont intéressés par les Portails Multimédia Mobiles : ceux qui fournissent l'accès à un réseau, par exemple les opérateurs de réseau, et ceux qui font des transactions. Pour ces deux groupes, les mêmes facteurs -joignabilité, richesse et attachement- sont importants pour la promotion commerciale du portail. Les opérateurs de réseau peuvent être très forts dans au moins deux de ces dimensions -joignabilité et attachement- et sont de ce fait très bien positionnés dans l'activité de portail. La troisième dimension -richesse- doit être couverte par des alliances avec ceux qui agrègent les contenus.

Les éléments traditionnels du monde des télécommunications qui étaient soumis à facturation ne sont plus pertinents. La facturation en fonction de la durée d'utilisation du réseau s'estompe déjà et disparaîtra rapidement car les clients s'habituent à l'idée que les connexions sont permanentes. La distance disparaîtra rapidement aussi, les adresses IP sont toujours locales. La facturation sera basée sur la disponibilité, le type de données et le volume. Le facteur-clé d'un système de facturation efficace sera la flexibilité.

La vraie opportunité pour les fournisseurs de services sera de prendre leur place dans la chaîne de valeur du m-commerce et, d'obtenir pour la facturation et l'assistance aux clients, un pourcentage des recettes pour les produits et services achetés. De plus, il y a l'opportunité d'agir en grossiste pour les fournisseurs de services. Il n'y aura pas qu'un modèle qui s'appliquera mais plusieurs. Comme la chaîne de valeur évolue et devient plus

complexe, de nombreux nouveaux acteurs apparaîtront tels que des courtiers pour l'information, des agents qui l'agrègent et des développeurs d'application.

0.2.8 Conclusions

L'UMTS est beaucoup plus que l'Internet ou les communications sans fil. La vision de l'UMTS est un environnement de réseaux hétérogènes, avec des changements rapides en terme de concepts et d'activités, où des organismes variés jouent différents rôles dans la chaîne de valeur. Les opérateurs mobiles sont bien positionnés pour exploiter les très nombreuses opportunités offertes par l'introduction des services multimédias mobiles de troisième génération à partir de 2001/2002, mais une foule de nouveaux acteurs du marché entreront en concurrence pour les clients.

L'UMTS continuera à se développer et à ajouter de la valeur, permettant aux acteurs de faire croître leurs activités Multimédias Mobiles jusqu'en 2010 et au-delà. De nouvelles opportunités de générer de la valeur apparaîtront pour les fournisseurs de services et de contenus, en s'appuyant fortement sur la personnalisation, la localisation, l'interactivité, l'environnement opérationnel et transactionnel, et le m-commerce. Le Portail Multimédia Mobile sera l'élément-clé de l'interface vers le client, ce qui donnera à son propriétaire un avantage concurrentiel dans le nouveau marché convergent.

0.2.9 Recommandations

Rec #	Recommandation	Section de référence
1	L'opérateur UMTS devrait saisir les nouvelles opportunités d'affaires au travers de partenariats avec des FSI, des Fournisseurs de contenus pour portail ou envisager ces activités en propre.	7.
2	Les opérateurs ont l'opportunité de monter dans la chaîne de valeur : <ul style="list-style-type: none"> de manière progressive vers un transport et une commutation "tout-IP", suivant les éditions 99, 00 et suivantes des normes 3GPP, évoluant vers des solutions HTML-DHTML-XML transparentes. en ayant accès au contenu au travers d'une Plate-forme de Portail Multimédia Mobile. 	5.
3	L'introduction, à temps et de manière harmonisée, de la portabilité de service, en liaison avec celle d'une Plate-forme de Portail Multimédia Mobile, permettra une gestion personnalisée de contenu. Des blocs fonctionnels de la Plate-forme de Portail Multimédia Mobile et son introduction par phases devraient suivre un plan avec étapes harmonisé.	4.3.1 4.2.1 (3.1)
4	Une vision claire et précoce de la structure et de la réservation d'adresses est vitale pour le succès de l'UMTS / IMT-2000. Une planification, à temps et par avance, des Noms de Domaine Internet, d'adresses IP et E.164 est important pour le secteur, pour être sûr d'une vision claire et précoce de la structure et de la	4.6

	réserve d'adresses.	
5	Toute réglementation devrait être limitée au minimum nécessaire pour atteindre l'effet souhaité. Des solutions internationales devraient être cherchées pour les problèmes réglementaires. Le cadre réglementaire devrait permettre aux diffuseurs publics et aux producteurs de programme de tirer avantage des nouvelles opportunités offertes par la convergence technologique dans un cadre commercial et en concurrence avec les autres acteurs du marché. Cependant, de telles activités commerciales doivent rester séparées strictement des activités subventionnées par l'Etat.	6.3
6	Les personnes devraient pouvoir transporter avec eux des terminaux mobiles IMT-2000/UMTS, partout dans le monde et sans aucune restriction, telles que droits de douane ou licence individuelle, à la traversée des frontières, et les utiliser par application des exigences de connexion normales. De tels terminaux mobiles devraient bien évidemment respecter les règles acceptées internationalement qui concernent les interférences, la santé et la sécurité.	6.6.1
7	Le 3GPP devrait étudier et définir des solutions UMTS pour : <ul style="list-style-type: none"> • la co-existence IPv4/v6 et l'intégration avec IPv6 • le contrôle de la qualité de Service, en fonction des applications • la sécurité IP en combinaison avec l'USIM • la gestion de mobilité/itinérance pour les services d'information (à base d'IP) 	5.1
8	Tous les acteurs devraient oeuvrer pour obtenir une acceptation globale du principe de la Déclaration, par les industriels, de la Conformité à des exigences mutuellement admises. Ceci simplifiera la mise sur le marché des futurs terminaux multi-modes.	6.6.3

0.3 RESUMEN EJECUTIVO

0.3.1 Introducción

El objetivo de este informe es describir UMTS, concebido como un sistema móvil multimedia, en el contexto de los desarrollos futuros en los campos de las telecomunicaciones, las tecnologías de la información (IT) y la media, cuya combinación hará posible la Sociedad de la Información. El concepto actual de redes de telecomunicaciones fijas y móviles independientes no es suficiente para explicar la realidad del entorno de negocio que se avecina. El interés debería centrarse en el potencial que tiene UMTS para abarcar nuevas tecnologías, conceptos y servicios. Podemos destacar como elementos de esta visión los siguientes:

- La convergencia gradual de las telecomunicaciones, las tecnologías de la información y la media, que conjuntamente harán posibles nuevas oportunidades globales para negocios y consumidores, al tiempo que se configura nuevas formas de hacer negocios y de proporcionar entretenimiento e información.
- Nuevos métodos que permitan a los usuarios gestionar y controlar grandes cantidades de información procedentes de fuentes diversas, de modo que puedan satisfacer sus propios objetivos e intereses. Se trata de un nuevo gran mercado personalizado cuyas necesidades no se pueden cubrir recurriendo a los conceptos de provisión de servicio existentes.
- Nuevas entidades en el futuro mercado en convergencia, tales como proveedores de contenido, proveedores de servicio de Internet y operadores móviles virtuales, servirán para proporcionar información a los usuarios que hay en el mercado. Un gran número de servicios surgirán de la Internet de hoy en día pero existirán tanto servicios basados en suscripción como servicios no basados en el pago de suscripción a los mismos. Tales servicios se extenderán al ámbito de las intranets corporativas donde la información se gestiona y se distribuye a grupos cerrados de usuarios en función de los intereses de la organización.
- Servicios móviles multimedia personalizados, que se convertiran en algo habitual en la futura oferta de servicios.
- Está teniendo lugar una revolución comercial en Internet a medida que las empresas constituyen comunidades electrónicas para optimizar sus canales de distribución y sus procedimientos de provisión. Existirán “mercados electrónicos (e-marketplaces)” para determinadas industrias así como para sectores especializados. El sistema de comercio “on line” será un importante motor para el comercio móvil. El desarrollo de pagos electrónicos mediante el móvil, basados en Internet, hará posible este negocio.

0.3.2 Nuevos actores en una cadena de valor cambiante

En este informe se analizan los elementos de la cadena de valor con objeto de que tanto la industria UMTS como los reguladores puedan comprender mejor la evolución que experimentará el mercado de los servicios móviles multimedia durante los próximos diez años. Actualmente, la cadena de valor de la red móvil se centra alrededor del operador de red, que percibe más del 90% los ingresos, en su mayor parte debidos a servicios de voz. La creencia general es, no obstante, que el avance de la tecnología, el crecimiento de los servicios de Internet y las nuevas necesidades de los usuarios finales están desafiando la cadena de valor tradicional.

La nueva y rápidamente cambiante cadena de valor contará con nuevos actores y entidades, y un gran número de operadores de red están ya adoptando nuevas estrategias de negocio para ampliar sus competencias y defender su posición competitiva. El proveedor de servicio multimedia será uno de los actores clave en la cadena de valor de la multimedia. Los ingresos se desviarán cada vez más hacia otros actores del mercado distintos de los tradicionales.

0.3.3 Nuevos servicios avanzados

Las nuevas oportunidades de negocio que introduce UMTS están añadiendo nuevos segmentos de mercado al mercado de telecomunicaciones existente y tradicional. UMTS ofrecerá nuevas posibilidades para la provisión de servicios, tales como:

- multimedia móvil de alta velocidad,
- localización,
- portabilidad de servicios,
- capacidad de comunicación personalizada y “en cualquier lugar”

La pregunta es qué servicios hará posible UMTS. Es claro que ni existe ni existirá una única “killer application”. Muchos de los servicios, si bien empezarán a prestarse en 2G, resultarán más asequibles económicamente en 3G. Otros servicios ya existentes experimentarán considerables mejoras gracias a las nuevas funcionalidades de localización, interactividad y multimedia móvil, con segmentación de clientes basada en el estudio de los distintos estilos de vida. La demanda de mayor productividad personal será también importante. Y continuarán difuminándose las fronteras entre los mercados de negocios y de gran público, así como entre la oficina y el hogar.

0.3.4 Portales móviles multimedia

El punto de convergencia para la provisión de información y entretenimiento, y la demanda de los usuarios finales, estará en el Portal Móvil Multimedia. Al ser el punto preferente del usuario final para la entrada a todos los servicios y contenidos basados en IP, el portal es donde el cliente interacciona con la entidad que proporciona los servicios. El portal presenta una enorme oportunidad de mercado para establecer fuertes relaciones con el cliente, que son esenciales para el éxito competitivo en el nuevo entorno de Internet.

Mientras que los portales fijos tradicionales se han diseñado como un mecanismo para organizar la provisión de información a segmentos de mercado específicos, el portal móvil se orientará a los usuarios individuales con objeto de reflejar sus necesidades de acceso seguro y robusto en ubicaciones y circunstancias cambiantes. Mediante la utilización de una plataforma inteligente de acceso IP con capacidad dinámica de selección de servicios, el propietario del portal podrá proporcionar servicios personalizados dependientes de la localización y que tienen en cuenta los gustos y necesidades individuales de los usuarios móviles. Este tipo de portal personalizado permite al cliente seleccionar, suscribirse y configurar todo tipo de servicios.

El Portal Móvil Multimedia no está restringido, como el portal tradicional, a Internet, sino que opera en un nivel superior de la cadena de control, proporcionando el acceso y selección de todo tipo de servicios basados en IP, incluyendo, por supuesto, la World Wide Web. Otros servicios, que serán gestionados por el portal, provendrán de proveedores de audio y TV, proveedores de servicio de aplicaciones (ASP), páginas amarillas, publicidad y el propio propietario del portal. Para el cliente, el portal será una página de inicio personalizada, que potencialmente puede reducir considerablemente el "churn". El establecimiento de alianzas con empresas que tengan una marca consolidada puede servir al propietario del portal para proporcionar servicios de valor añadido a los clientes bajo su propia marca.

0.3.5 Estandarización

El acceso inalámbrico ha introducido un nuevo conjunto de estándares y protocolos que añaden un nivel de complicación a aplicaciones que no son necesariamente compatibles con el mundo de Internet. En el caso de UMTS dichos estándares deben ser preparados para aquellos servicios que se proporcionarán también sobre la red fija. Además, la armonización de las características de interfuncionamiento entre terminales fijos y móviles puede convertirse en objeto de estandarización. Más aún, el estándar debe especificar el impacto del direccionamiento, que es muy diferente entre los mundos de telecomunicaciones e IP.

La armonización de los estándares UMTS en el marco de IMT-2000 con los estándares del mundo Internet es necesario para hacer del Portal Móvil Multimedia una solución que funcione en el entorno internacional, especialmente para el usuario en roaming. El papel del UMTS Forum es ampliar el alcance del proceso de estandarización y convertir sus ideas en requisitos y temas de trabajo. ("work items").

0.3.6 Regulación en un entorno convergente

Hoy en día, en la mayor parte de los países del mundo, los sectores de telecomunicaciones, difusión ("broadcasting") y tecnologías de la información (es decir, sectores verticalmente independientes) se regulan separadamente. En un entorno convergente surge la pregunta de si este enfoque resulta apropiado para fomentar la competencia, la innovación y la provisión de servicios. Parece más razonable un enfoque más horizontal, donde todos los sectores tengan la misma infraestructura de regulación, que sea neutral respecto a la tecnología y el sector y que se base en las leyes de la competencia, de manera que se impida que las partes puedan abusar de su posición dominante respecto a la provisión de servicios.

La regulación debe ser siempre aplicada en la forma y el momento apropiados. La naturaleza global de IMT-2000/UMTS combinada con la convergencia en el sector hace prever una potencial dificultad a la hora de poner en vigor las leyes de un país en otros países. Además, los rápidos cambios en cuanto a servicios y productos, que se miden en meses y semanas, presenta un enorme reto para quien busque una solución legislativa para un problema concreto.

Es necesario buscar soluciones pragmáticas a nivel internacional y, como se ha visto en el mundo de Internet, la autoregulación puede ser utilizada como instrumento para enfrentarse a ciertas prácticas, como contenidos ilegales y perjudiciales.

0.3.7 Nuevas estrategias de negocio

A la hora de discutir relaciones potenciales de negocio en el mercado convergente, se pueden considerar varios modelos, que comprenden los roles de, por ejemplo, el operador de red, el

- ***El modelo fragmentado***, en el cual los roles de negocio son desempeñados por distintos actores del mercado. La tarea de ofrecer al usuario final un paquete de servicios coherente, así como interfaces comerciales simples puede ser complicada.
- ***El modelo de alianzas***, en la cual los actores del mercado que ostentan los roles mencionados con anterioridad cooperan de forma organizada. El tema de la competencia puede ser importante en este modelo.
- ***El modelo propietario***, en el cual los roles principales son propiedad de una organización. La responsabilidad de proporcionar servicios de usuario final estará clara, pero es necesario mantener la suficiente competencia. Este modelo debe permitir alianzas adicionales y/o oferta de servicios adicional de proveedores independientes, por ejemplo, acceso del usuario final a otros portales y a otros proveedores de contenido.

Hay dos grupos fundamentales interesados en portales móviles multimedia: aquellos que proporcionan acceso a redes, por ejemplo operadores de red, y aquellos que ejecutan transacciones. Para ambos grupos, los mismos factores (alcance, riqueza y cercanía al cliente) son importantes a la hora de posicionar el portal en el mercado. Los operadores de

red pueden ser muy fuertes en al menos dos de estas dimensiones (alcance y cercanía) y están por tanto bien posicionados en la industria del portal. La tercera dimensión (riqueza) se debe cubrir mediante el establecimiento de alianzas con agregadores de contenido.

Los elementos tradicionales que se facturaban en el mundo de las telecomunicaciones pierden importancia. La etapa de la facturación por tiempo se desvanece y desaparecerá pronto a medida de que los usuarios se acostumbren a la idea de que las conexiones están siempre establecidas ("always on"). La distancia desaparecerá rápidamente también, pues las direcciones IP son siempre locales.

La facturación estará basada en disponibilidad, tipo de datos o volumen. La clave de una facturación eficaz será la flexibilidad.

La verdadera oportunidad para los proveedores de servicio será ocupar un lugar en la cadena de valor del comercio electrónico móvil, y como contraprestación de la facturación y atención al cliente, recibir un porcentaje de los ingresos de los productos y servicios vendidos. Además, existe la oportunidad de convertirse en un agente mayorista para los proveedores de contenido.

No existirá un modelo de negocio, sino una serie de modelos diferentes. A medida que la cadena de valor evoluciona y se vuelve más compleja, se espera que aparezcan muchos de los nuevos actores, tales como brokers de información, integradores de información y desarrolladores de aplicaciones.

0.3.8 Conclusiones

UMTS es mucho más que Internet o comunicaciones inalámbricas. La visión de UMTS es de un entorno de red heterogéneo con cambios rápidos en cuanto a conceptos y negocio, donde distintas organizaciones desempeñan roles diferentes en la cadena de valor. Los operadores móviles están bien posicionados para explotar las nuevas y numerosas oportunidades que surgen a raíz de la introducción de los servicios móviles multimedia 3G a partir de 2001/2002, pero una gran variedad de nuevos actores competirá con ellos en el mercado para conseguir clientes.

UMTS continuará desarrollándose y añadiendo valor, y permitirá a los distintos actores hacer crecer sus negocios de multimedia móvil hasta más allá de 2010. Surgirán nuevas oportunidades para proveedores de servicio y proveedores de contenido, a través de la personalización, localización, interactividad, el entorno de operaciones y transacciones y el comercio electrónico móvil. El portal móvil multimedia será un elemento clave en la interfaz con el usuario, lo cual dará a su propietario una ventaja competitiva en el nuevo mercado convergente.

0.3.9 Recomendaciones

Rec #	Recomendación	Sección de Referencia
1	El operador UMTS debería afrontar las nuevas oportunidades de negocio a través del establecimiento de alianzas con ISP, proveedores de contenido del portal o bien la realización de dichas funciones dentro del propio operador.	7.
2	Los operadores tienen la oportunidad de progresar en la cadena de valor, a través de: <ul style="list-style-type: none"> • La incorporación gradual de transporte y conmutación "todo-IP", de acuerdo con las especificaciones 3GPP "Rel. 99", "Rel. 00" y posteriores versiones orientadas a soluciones transparentes de tipo HTML-DHTML-XML. • el acceso a contenidos mediante la Plataforma del Portal Móvil Multimedia. 	5.
3	La introducción armonizada y puntual de la "portabilidad de servicios", en conjunción con una plataforma de portal móvil multimedia permitirá la gestión de contenido personalizado. Los bloques funcionales del portal móvil multimedia y su introducción gradual deberían hacerse de acuerdo con un plan de proyecto armonizado.	4.3.1 4.2.1 (3.1)
4	Dar pronta solución al tema de reserva y estructura de direcciones es vital para el éxito de UMTS/IMT-2000. La planificación anticipada de nombres de dominio de Internet, direcciones IP y direcciones E.164 es importante para procurar una solución para el tema de reserva y estructura de direcciones.	4.6
5	El componente regulatorio se debe intentar reducir al mínimo imprescindible para conseguir el efecto deseado. Se deben buscar soluciones internacionales a los problemas regulatorios. El marco regulatorio debería permitir a los servicios públicos de difusión ("broadcasters") y a los productores de programas ("program makers") aprovechar las nuevas oportunidades que ofrece la convergencia tecnológica en un marco comercial y en competencia con otros actores del mercado. Sin embargo, dichas actividades comerciales se deberán mantener estrictamente separadas de las actividades subvencionadas por el estado.	6.3
6	Los individuos podrán llevar los terminales móviles IMT-2000/UMTS consigo por todo el mundo sin restricciones en las fronteras, del tipo de aduanas o licencias individuales, y podrán usarlos siempre que respeten los requisitos normales de conexión. Dichos terminales deberán cumplir, por supuesto, las reglas internacionales referentes a interferencias, salud y seguridad.	6.6.1

7	3GPP investigará y definirá soluciones UMTS para: <ul style="list-style-type: none">• coexistencia IPv4/v6 e integración con IPv6• control de QoS, dependiendo de la aplicación• Seguridad IP combinada con la USIM• Gestión de la movilidad/roaming para servicios de información (basados en IP).	5.1
8	Todos los actores deberían contribuir a la aceptación global del principio de “declaración de cumplimiento por parte de suministradores” (“Manufacturers Declaration of Conformance”) de una serie de requisitos acordados mutuamente. Esto simplificará la colocación en el mercado de los futuros terminales multimodo.	6.6.3

1 THE DEMAND FOR A "NEW FOCUS"

In order to understand the role of next generation wireless services in the broader technology landscape, it is important to understand the current state of the Internet industry and other enabling technologies that shape its development. The Internet is transitioning from an inexpensive medium for advertising, marketing, and customer support to a common platform for transactions and business applications. At the same time, technological and commercial developments are melding together information, communications, commerce and entertainment into one large, consolidated industry. Part of the reason for this evolution is because more consumers are accessing the Internet using multiple devices and over multiple communications networks. They are also changing their behaviour and consumption patterns. In addition, tools and facilities are available that improve the consumer Internet access experience.

Wireless access to the Internet is going to drive the overall development of the Internet for several reasons:

- Wireless allows service providers and Internet businesses to increase their mobile culture and total service consumption;
- The mobility and immediacy offered by wireless allows Internet content delivery and commerce to be non-location-specific;
- The person-specific nature of wireless allows companies to develop customer profiles that enable them to narrowcast and distribute better value-added information to customers; and lastly
- Location-based facilities and services provide another tier of customer knowledge that allows Internet businesses to deliver "context" specific services that also improve customer value.

In short, wireless is an opportunity for Internet businesses to learn more about their customers, understand their customers' consumption patterns, strengthen their customer relationships and provide more personalised services. This is a critical component of Internet business strategies and what wireless Operators/service providers bring to the table in a full Internet solution.

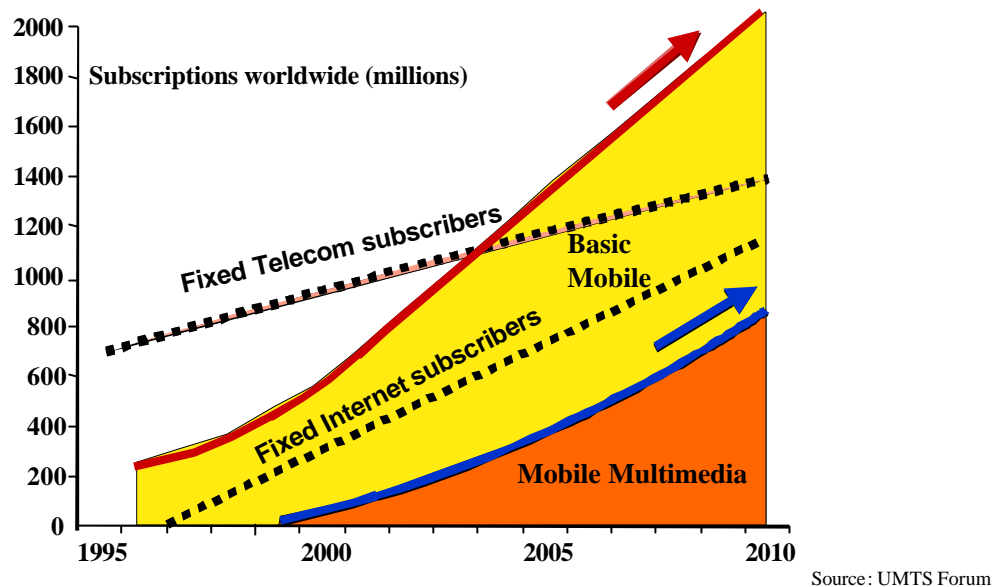


Figure 1.1: Mobile Terminals become Internet enabled

At the start of the year 2000 the global mobile market counted 470 million cellular users, Internet approx. 260 million users. The diagram indicates that the Internet will reach a huge mass market size very soon and this will become the base for the launch of its services on the mobile side.

Mobile Multimedia Services are Set to Increase

The investigations in the UMTS Forum have shown, that medium/high bitrate services and applications will play a dominant role in future mobile communications.

Below you will find the frequency spectrum demand in the EU15¹ as a consequence of the expected 3G/2G traffic according to various service classes. In the year 2005 the mobile multimedia traffic will already play a significant role in relation to speech traffic. However, in the year 2010 mobile multimedia traffic will far exceed speech.

¹ EU15 = European Union, 15 Member States

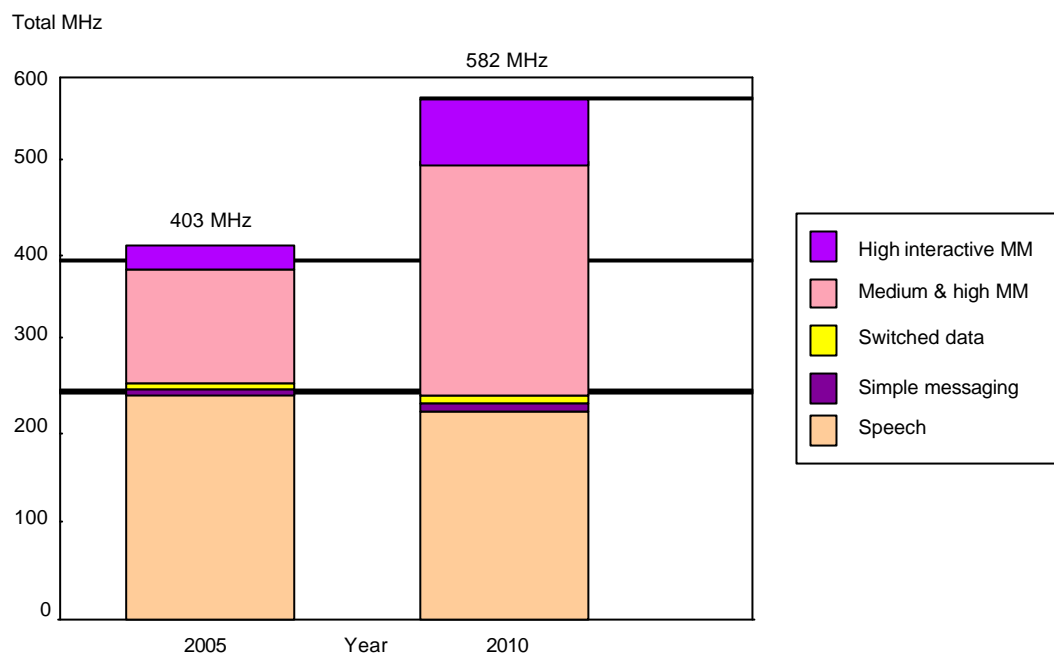


Figure 1.2: Frequency Spectrum Requirements for the Years 2005/2010, Example EU15

The Forum's decision to explore an Extended Vision:

The fundamental reason for the foundation of the UMTS Forum was to prepare the 3G business marketplace for a new market for "Mobile Multimedia". Licensing and spectrum were topics for the initial UMTS work, and the results can now be seen in the license process for more than 100 UMTS/3G licences (Fig. 1.2) worldwide and in the spectrum designation of the so-called IMT-2000 Core Band.

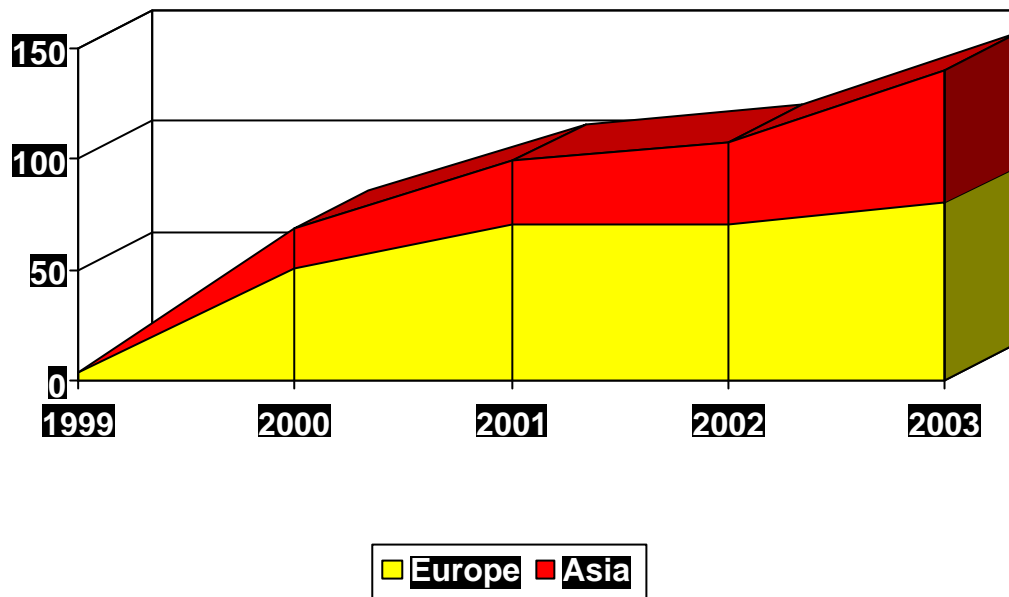


Fig. 1.3: Forecast 3G Licensing Activity - Europe and Asia

This report seeks to position UMTS towards the future developments in communications, Information Technology (IT) and media which together will combine to deliver the Information Society, of which UMTS will be the mobile component. That includes today's view on mobile and fixed telecommunications networks. In this report a clear focus is maintained on the UMTS longer term potential addressing to embrace new technologies and concepts.

This report analyses the elements of the value chain in order to construct a roadmap which allows the UMTS Industry and Regulators to better understand the likely evolution in the information services world throughout the coming decade. The Report has identified issues relating to an open standard's approach covering international roaming and access, regulation especially in a cross-sector convergence environment.

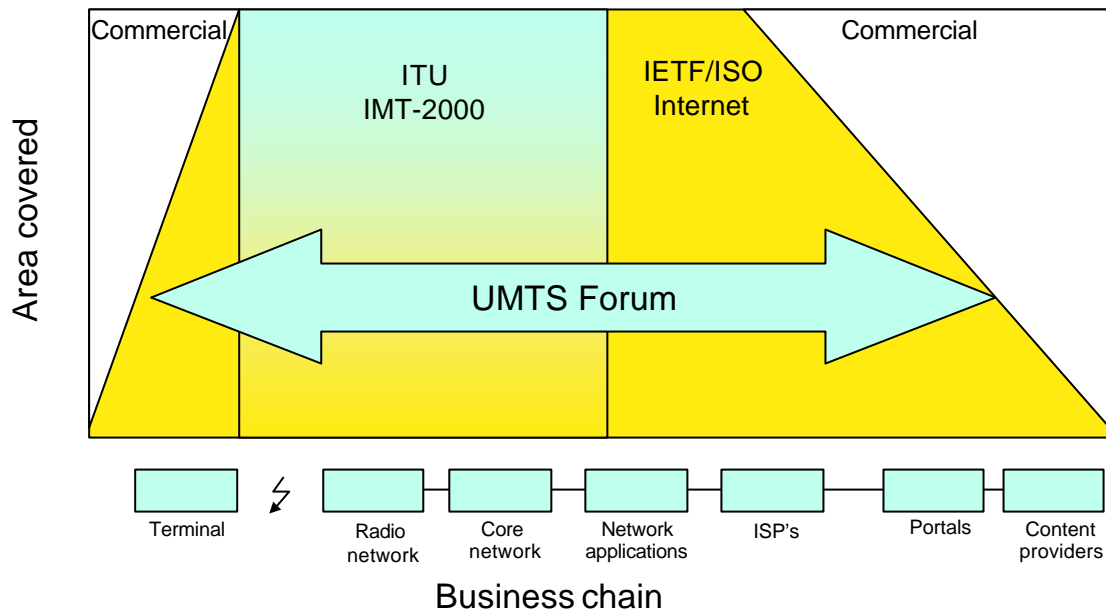


Figure 1.4: Positioning UMTS Forum

1.1 The UMTS Business Plan

The upcoming UMTS license process in a number of countries has already caused many strategic and business-oriented investigations on UMTS deployments. Radio coverage and traffic volume assumptions influence the results to a large extent. It is a consequence of the chosen business model, which generally follows the traditional approach comprising radio access transport and switching. Unsatisfactory results of business plans make it difficult to decide how to deploy UMTS services and how to enter the new market place of mobile multimedia. Therefore you will find enough good reasons to analyse the multimedia business segment with the aim to find appropriate elements of value to enrich the UMTS business case. If they can be identified and bundled into a well determined project, UMTS will get the expected stronger profile as a pacemaker for the mobile multimedia business and the relevant business case will be improved.

1.2 Challenges in the Value Chain

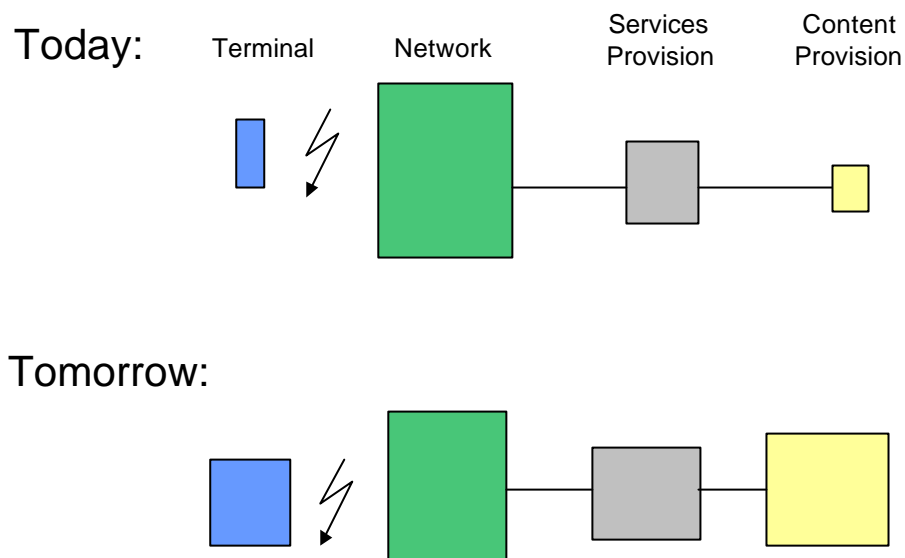


Figure 1.5: UMTS: Value Chain, Size of Business Changing

The Multimedia Value Chain is described in UMTS F Report No. 1 and No. 8. It shows that the delivery of multimedia services involves a number of players and activities. The market analysis from Analysys/Intercai (Report No. 8) highlights the Multimedia Service Provider (MSP) as the key player in the multimedia value chain. MSPs purchase multimedia information (content) from third party suppliers such as TV programme providers and publishers. Then they format the content to what they believe is appropriate for their customers ("filtering") and store it on a multimedia server or "server host".

The above figure indicates the changes in the business values of the single elements as meanwhile seen from a number of studies and market forecasts. It gives a clear signal to the mobile industry of the need to change their positioning with regard to applications, services, and content when planning their future strategic orientation. It includes the possible roles as VAS Providers, Service Providers (ISPs, ASPs and Portal Operators) and Content Providers.

2 THE MOVE TO MULTI-SERVICE MARKET OPPORTUNITIES²

The new business opportunities with UMTS are adding new market segments to the existing and traditional telecommunications market. This chapter tells about the new service opportunities. Given, that UMTS will offer

- fast mobile multimedia capabilities
- service portability
- personalised and ubiquitous communication capabilities

The question arises which services will result from UMTS.

A single “killer” application clearly does not and will not exist.

To understand requirements and dependencies some representative applications reflecting the benefits of UMTS for end-users have been chosen.

As a methodology with a specially devised scoring system more than 30 services were evaluated from:

- end-user value perspective
- 3G versus 2G service value perspective.

The ranking of the chosen services is based on different parameters (starting from interactivity degree to user interface medium via content value). The purpose of this scoring and ranking is to find the likelihood of acceptance of some key UMTS services.

Some of the most interesting services were identified based on the two criteria given above.

2.1 Services

In general, basic service concepts are common between 2G and 3G. However, the service delivery mechanisms and user device attributes and interfaces will be vastly improved with 3G. The applications being developed for the web and intranets will be a key source for 3G mobile applications. Many people will prefer to access the information superhighway via mobiles rather than personal computers. Most mobile users will use the Internet in different ways from personal computers users: they will go for short messages and quick transactions rather than leisurely browsing.

Mobile commerce is not explained as a service in itself. It covers too many services like m-broking, m-shopping, m-auctioning, m-banking, m-cash etc. Some typical services are described briefly.

² For more detailed information please see also ANNEX I

2.1.1 Mobile Banking

Mobile banking is a subset of mobile commerce. Mobile commerce is any transaction with a monetary value that is conducted via a mobile telecommunications network. Mobile banking together with mobile broking and mobile wallet/cash are part of mobile financial services.



Drivers

- Customer requirement for anytime, anywhere banking
- Banks' requirement to reduce banking overheads
- Trend that mobile phone customers will outnumber fixed telephone lines
- Trend of strong growth of telephone and Internet banking

Inhibitors

- Bank customers who do not use phone or internet banking
- Phone banking
- Security concerns (real or perceived)

2.1.2 Mobile Shopping

Mobile shopping is part of mobile commerce. Mobile shopping groups together all services that allow you either to purchase and pay on-line goods/information with your mobile phone, or to use your mobile phone as a payment terminal at public access points like drinks machines or retailers.



Drivers

- Mass market mobile
- Mobile commerce
- New technologies for wireless like WAP, OS, GPRS, EDGE, 3G, Bluetooth, Biometry (i. e. finger print recognition)

Inhibitors

- Secure transaction techniques
- Standardisation (for encryption/decryption and digital signature)
- Trustworthy third party
- Shopping habits

2.1.3 Location-Based Services

Location based services provide value for an end-user in certain locations. In this case value relates to excitement, pleasure, rewarding experience and more tangible things like information, speed and convenience.



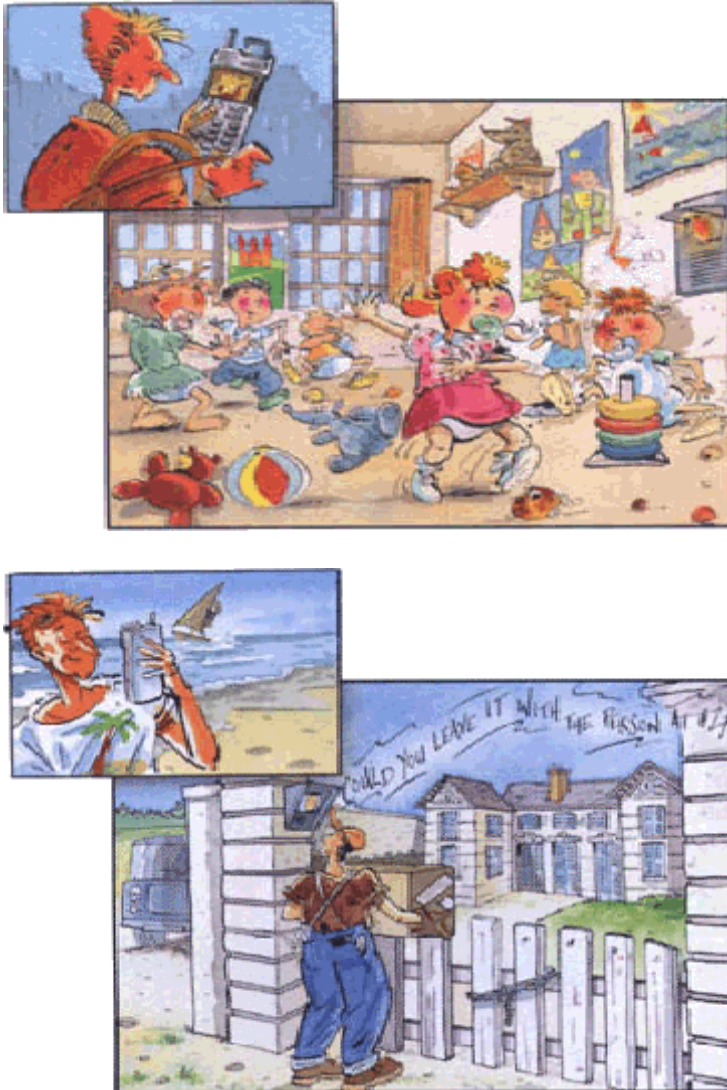
Drivers

- Trend of strong growth of mobiles and Internet services
- Growth of mobile penetration
- Customer requirement for easier and faster services
- Customer requirement for services 'here and now'
- Customer requirement for more value (excitement, pleasure, rewarding experience and more tangible value like information, speed and convenience)

Inhibitors

- People are not willing to spend more money for this service than for traditional services (location based entertainment has to be cost-effective)
- Service is not sufficiently user-friendly
- Privacy and confidentiality reservations

2.1.4 Remote Monitoring



Drivers

- flexible monitoring of people, places, property, environments, for health, safety and security.

Inhibitors

- Every form of surveillance without direct permission is violating the personal integrity. Even with permission, like a video telephone call, users can feel uncomfortable.
- Legal issues are important.
- Finding market acceptance

2.1.5 Interactive Games

Interactive games are an example of the type of mobile infotainment available on modern mobile handsets. They allow the player to download new games or levels, compete against other remote users and upload their highest scores, etc.

Although games do exist today, 3G will enhance and develop their interactivity and multimedia content. The key changes to games that will be seen as new technology is implemented are:

- Improvements to user interface (i. e. use of audio and video)
- Interaction with other players (group gaming)
- Ability to download new games and game upgrades over-the-air or via kiosks
- Security improvements will allow gambling, lottery and competition type gaming to use the wireless platform.

2.1.6 Experts on Call

Experts on Call is an information advisory and consultancy service where consumers and business people can seek and obtain specific expert advice at anytime via their mobile Internet device.

A few examples of “Experts on Call” are

- Technical advice such as help making adjustments to a classic car engine
- Assistance resolving everyday do-it-yourself projects or household appliance dilemmas
- First aid advice regarding a minor injury



The basics of how to change a tyre on an automobile



On some occasions the advice may even come from a close friend or a family member, because an agreement before a final buying decision saves time and money whether it is a house, a piece of furniture or a gift for a friend.



Drivers

- Extension of Customer services offering to include experts on call
- Individual experts and bureaus and agencies to provide directory and assignment

Inhibitors

- Cost of service
- Constraints in billing
- Users don't become familiar because it's not frequently used
- Coverage may not be ubiquitous

2.2 Key Market Segments

Today, there is already a blurring of traditional business/consumers market segmentation and this will be even more the case tomorrow. We can think more in terms of lifestyle management rather than business/consumers market segmentation.

The most important lifestyles are as follows:

- Business professional
High value mobile users (e. g. busy decision makers)
Intranet access, messaging, and scheduling systems
- Product Managers
Users with specific occupational requirements for high volumes of information whilst mobile
(Require remote and mobile access to corporate and external information)
- Young Generation
Often early adopters of technology
Messaging, games, entertainment-oriented services
- Family
 - Parents
In many countries, both parents now work and share responsibilities of maintaining the home and of childcare
 - Children
who will be able to communicate with their parents
- Senior citizens
3G will enable more reliable support electronically and reduce the requirement for labour intensive support services
Medical monitoring, location based medical service, family, carers, social workers

Traditional and lifestyle segmentation – some services

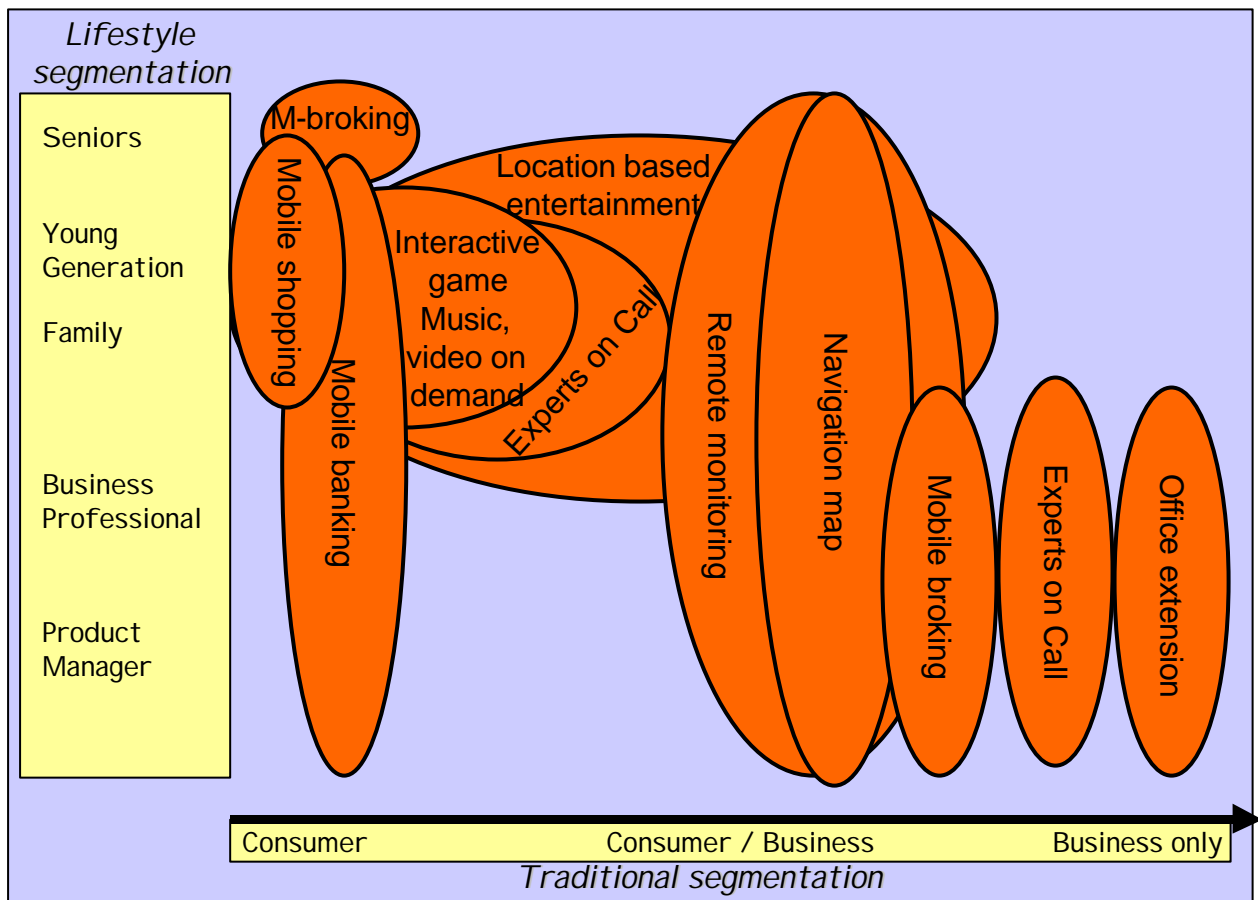


Figure 2.1: Traditional and lifestyle segmentation

2.3 Trends with 3G Mobile Services

Many services, although they may start with 2G will become more affordable using 3G. Services which already exist will be greatly improved with interactivity and mobile multimedia with customer segmentation based on lifestyle management.

Blurring of traditional business/consumers market segmentation (it is the same person communicating, whether synchronising his schedule or sending a message from home). While work-oriented applications are believed to drive the 3G market in Europe and in the US, in Japan the high value placed on increasingly more sophisticated consumer-oriented equipment could have a substantial impact. The demand for increased personal productivity is also of importance. The blurring of boundaries between work and home will continue.

2.4 Development of the Web

The Internet is a largely wide open, unregulated, and intensely competitive market. There are literally thousands of companies providing consumers and businesses access to the Internet. There are also countless firms involved in providing specialised Internet services such as aggregated and personalised information and content, community-of-interest World Wide Web (WWW) sites, business and consumer commerce services, direct marketing e-mail services, Web hosting and design services, and other services.

The competitive landscape of companies involved in the general Internet market is a unique mixture of firms. It includes companies with less than four years of history that have amassed multi-billion dollar market capitalisation values, but have top-line performance of only a few hundred million dollars and no sign of near-term profitability. It also includes very established and widely known communications, media, and technology multinational conglomerates.

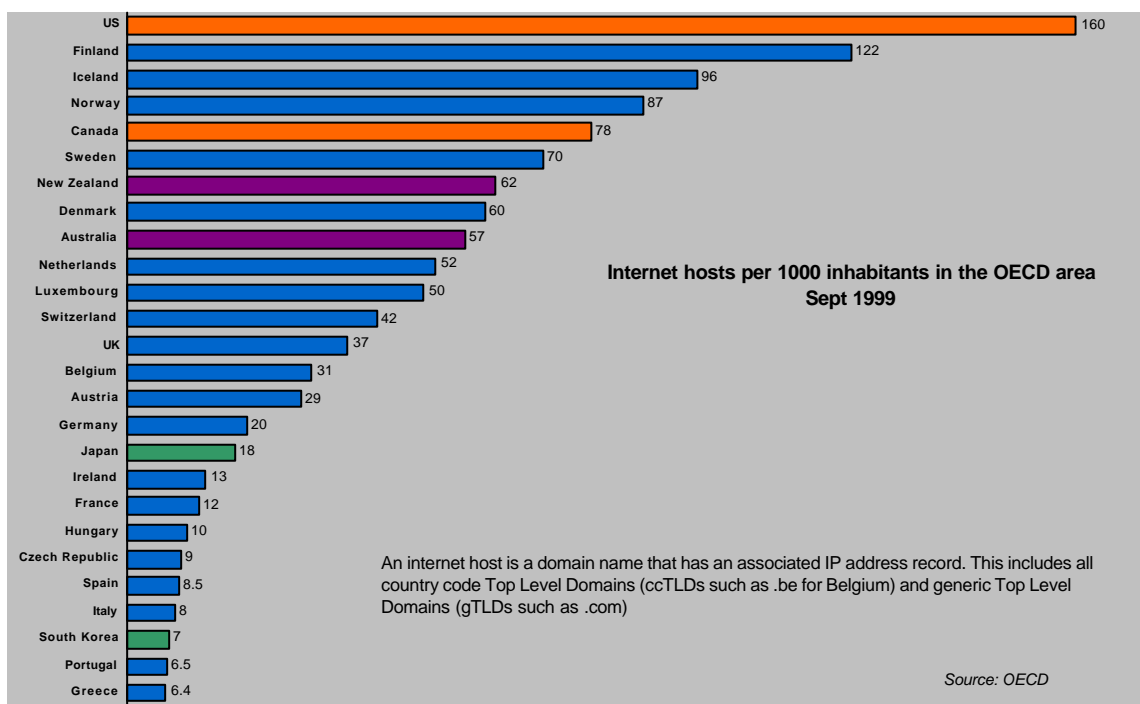


Figure 2.2: Where are Internet hosts?

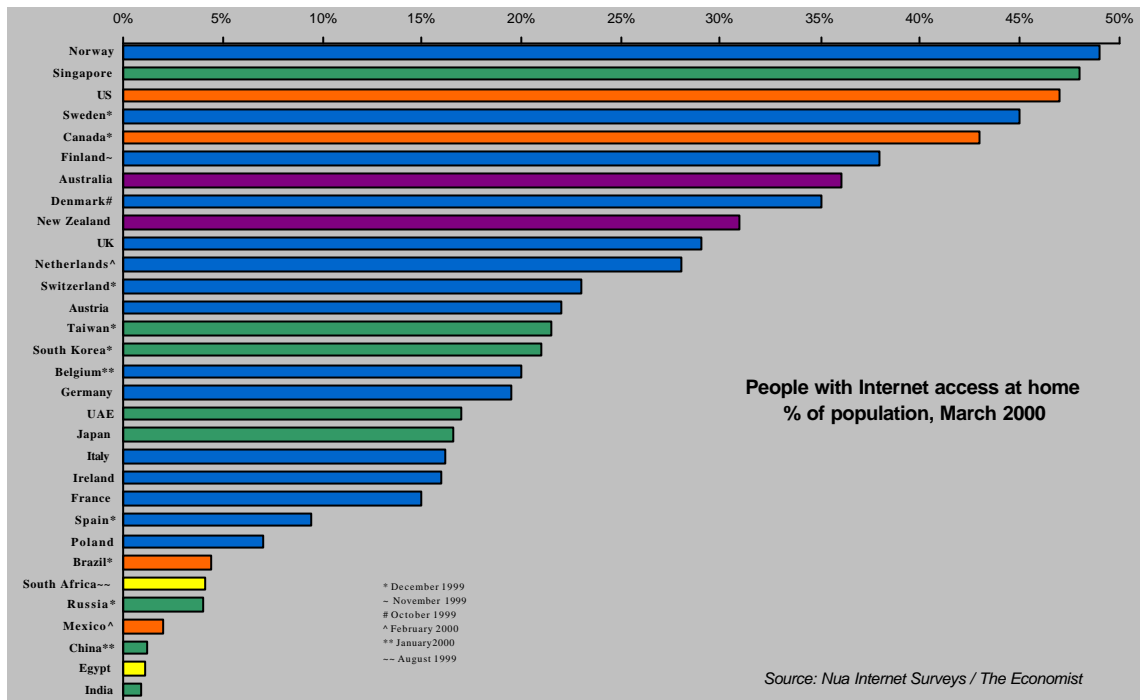


Figure 2.3: Internet at home

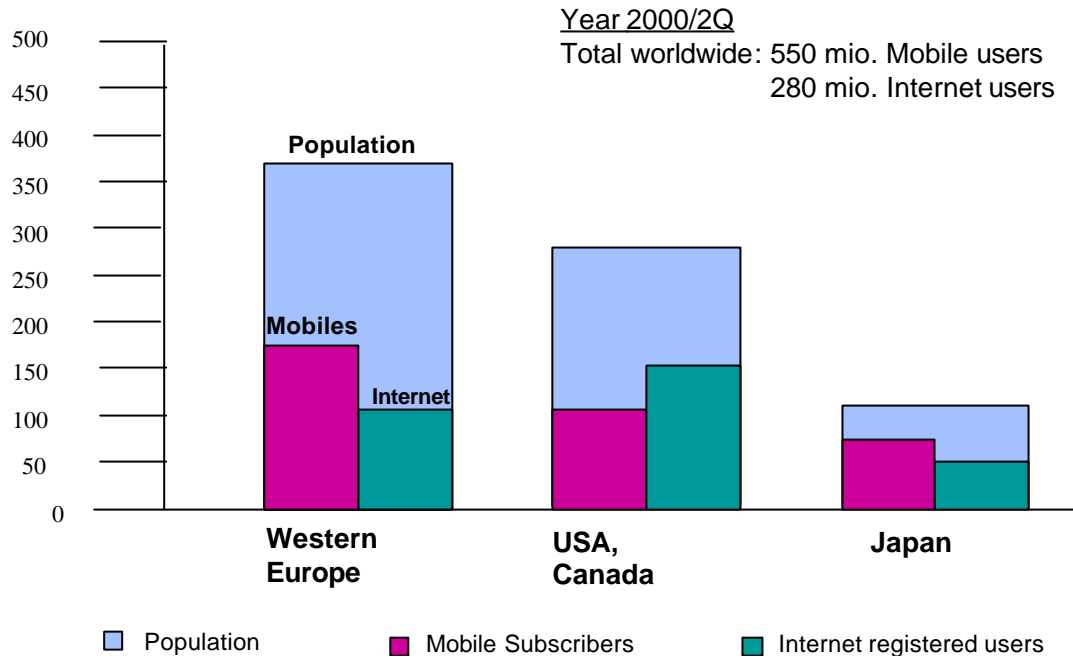
The Web Usage

The WWW is unquestionable the fastest growing part of the Internet. The World Wide Web (WWW) was released by CERN in 1992. Already in 1995, the WWW surpassed File Transfer (FTP) data as the service with greatest traffic. Today, WWW browsing is the leading Web application (> 90 %) together with E-mail, followed by entertainment and work.

The Internet Users

In total, the worldwide Internet market grew from several ten million users in the early 90ies up to approx. 280 mio. in the year 2000/2Q. Fig. 2.5 shows the status for Western Europe, USA and Canada, Japan and Korea in contrast to population and mobile users.

**Population, Subscribers,
Users (million)**



Source: Siemens AG

Figure 2.4: Internet Market Size Year 2000 in relation to Mobiles and Population

These Internet figures are far higher than the numbers of data users in traditional telecoms networks. Thus, it is evident that the mobile "data"-user will preferably access Internet rather than traditional wireline data networks. Internet is already becoming a mass market.

Another message in this diagram comes from the dominating large proportion of mobile users in Western Europe and in Japan and Korea. It indicates, that a growing percentage of mobiles accessing Internet would increase the impact on the Internet itself: its functionality and services, its protocols and its business model.

Internet Portals

Portals have evolved from search engines, through the stage of being points of content and service aggregation. Altavista, for example, provided the appropriate search capacity for 120 million web pages in the Internet. The fast growing number of web pages (see Fig. 2.5) led to specialised catalogues, the Portals. Now, mobile Operators are increasingly launching Portals for managing wireless Internet services. The Portal itself represents the point of convergence between wireless and fixed-line Internet services as a point of complex content and service delivery. The number of Portals is vastly growing: by the end of the year

2000, there will be approximately 100 million wireline and 16.7 million wireless Portal end-users in the Western European market, according to the recent study from the Strategis Group³. The Portals have developed to digital virtual market places. Not only the number of web pages, but also the number of Portal users nearly double every year. Fig. 2.5 gives an example what Portal players are dominating in the US and German market place.

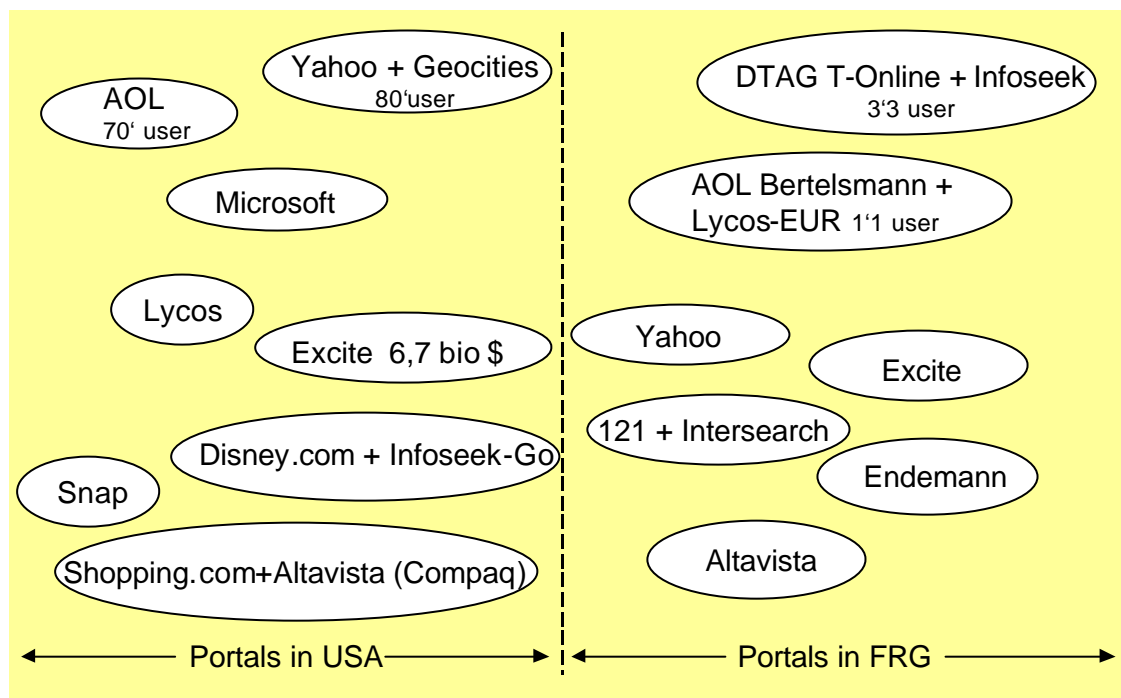


Figure 2.5: Example: Internet Market Places (Portals), Status I/1999

³ Europe: @StrategisGroup.com

As "mobile" multimedia can be seen as extension of Internet or Intranets, the question will arise: "Who will be a dominant Mobile Multimedia Portal player, will he be from the telecom Operators' side or from the Internet-ISP or content side?" Three trends of Portal developments are visible today:

1. **Content-oriented Portals:** *They are tailored search catalogues, towards specific market segments, e. g. Infoseek, Amazon, TV Portals.*
2. **End-user-oriented Portals:** *They are specialised for certain user categories, e. g. wireline vs. wireless Portals, Intranet Portals, WAP (mobile) Portals.*
3. **Convergence-oriented Portals:** *Concepts to integrate various user categories via different access networks into a Multi-Portal, e. g. the Multi Access Portal VIZZAVI⁴, providing multi-device service, multi-linguality.*

These Portals do include content management for Data, Speech, Messaging, Audio/Video, further user-related data based on users' profile and location, unified mail and accounting.

⁴ VIZZAVI is a 50/50 partnership between VivendiNet (a joint venture between Vivendi and Canal+) and Vodafone AirTouch Plc ("Vodafone").

3 CONVERGING THE TELECOM AND INTERNET MODEL

3.1 Positioning the Mobile Industry

In the light of the new business chain, the issue is to consider whether to simply provide a wireless Internet Protocol (IP) pipe to a service offering hosted elsewhere on the Internet, e. g. at a Portal like Yahoo, AOL, T-Online, Excite or Infoseek, or to go for a harmonised end-to-end solution. The wireless IP pipe business using tunnelling will tend towards a commodity bit-shifting operation, where cost, coverage and data rate are the only competitive dimensions. By carefully developing and pre-selecting useful Internet-based mobility services with competitive tariffs, the user will be encouraged to buy into UMTS services.

At issue is the location of the subscriber profile records, which reflect the personalised service choices of the end-user: message filtering options, choice of mobile information and type of mobile device, correlated with name, billing address, mobile phone number and e-mail address. This store of data, three to five years from now, will permit additional returns through selectively targeted mobile e-commerce and advertising. UMTS Operators have three distinct separate or combined possibilities:

Firstly, they charge the subscriber on a time dependent call basis. This makes it possible to get a revenue stream via a small additional charge for mobile Internet services and means a business return is possible well before mobile commerce and advertising become feasible. Added to traffic revenue, the Operator is in a commanding position to capture or selectively share this revenue with value chain partners on its own terms.

Secondly, the Operator provides IP-packet transport (e. g. GPRS-based); all necessary to integrate Internet services with IN, voice, data and fax services and allowing volume based charging in addition to time.

Thirdly, in future, the Operator will know the subscriber's location using emerging cellular positioning technologies. Positioning adds end-user value through information customisation, e. g. details of the nearest restaurant or automatic conversion of e-mail to speech for a driver of a moving car. In future, location information will enormously increase the revenues combining it with content. This will allow applications related charging.

Wireless Internet will become one of the media channels for content providers, and wireless network Operators will join. The WAP-Portal offerings of GSM Operators and i-Mode offerings of NTT DoCoMo are examples of a new strategy. The mobile Portals are unique because they are a solution in which Operators and service providers can manage content and integrate with communication and transactions.

The arrival of WAP⁵ and i-Mode are generally seen as the first steps of the convergence between the Mobile Telecom industry and the Internet and content industries. They signify an important transition moment: players from these different industries are coming together and positioning themselves for the future revenues of Wireless Internet. This has large

⁵ Wireless Application Protocol

implications on mobile network Operators ways of doing business, and eventually they will have to redefine their position in the value chain.

The Internet Service Provider (ISP) Function

The simple definition of the ISP is definitely providing access to the Internet. The level of service, the set of functions supporting the end-user from the ISP varies. The client-server model leads to the "[user@host](#)" account (Point of Presence PoP) which means, that the ISP has to care about the user's addresses and applications-related protocols. The ISP can start from tunneling services up to mail or HTTP hosting services etc. In all cases of accessing Internet via tunneling or HTTP, E-mail, FTP or TELNET the ISP has the responsibility for the end-user's account. As a consequence the "All-IP" UMTS network takes the UMTS Operator into an ISP position. It is combined with extended functionality dealing with the roaming user: "Mobile ISP". The additional complexity comes from inter-Operator roaming.

Portal and Content

Providing the Portal does not imply creating the content. Content feeds are likely to come from existing content providers or other Portals, but with subscriber data being captured by the Operator. It naturally follows that the first applications should focus on building the subscriber base and increasing airtime, namely messaging applications. Next should come applications which drive subscriber profile data capture, such as personalised subscription-based content push and wireless personal information synchronisation. Only after building the profile database can mobile e-commerce and advertising be successful.

For Operators with strong brands and a desire to reduce churn and increase their share of the customer value chain, becoming a true Mobile ISP means offering their own Mobile Internet services to users on a wireless Portal platform integrated with billing, customer care and positioning systems.

3.2 Defining A Portal

Portals' current popularity arises directly from the information explosion. Hence, finding information becomes very difficult and even easily getting to it, is more difficult. The definition of a Portal has to do with virtual market places within Internet and Intranets and its single point of access to aggregated information - someplace you go through to get something else. It could be a Web "supersite" or search engine that provides a variety of services including Web searching, news, white and yellow pages directories, free e-mail, discussion groups, online shopping, and links to other sites.

A search engine is the basis that works like a navigator for web sites, but in the future also for direct-marketing and e-commerce.

Search engines enable to control Internet commerce; together with ISP servers, they also control end-user access and take over administration. Very important is the capability to optimise the search process according to the user's profile and business objectives of the Portal Operator. Therefore a possible definition for today's Portals is:

A Portal is an entry point to a wealth of information and value added services. Portals can be personalised and are Internet/Intranet-based with browser user interfaces. Portals will deliver content according to the device's characteristics and user's needs.

The Portal is a moving target in a fast changing business world. Thus, a Portal Roadmap may show the evolution in this area.

What are the success factors of Portals?

- Relevance and Response: Users go to a destination Portal and find what they need quickly.
- Personalisation: Portals provide personalised information in the form users want it.
- Value-added services: Users get addicted to services such as e-mail and instant messaging, speech and audio/video etc.
- Unique subscribers: the most critical metric is how many unique subscribers a Portal has that will return to the site.

These points are valid for Cellular Operators and for those who build a Portal platform. So, the key to success is knowing one's users and providing them with remarkable value.

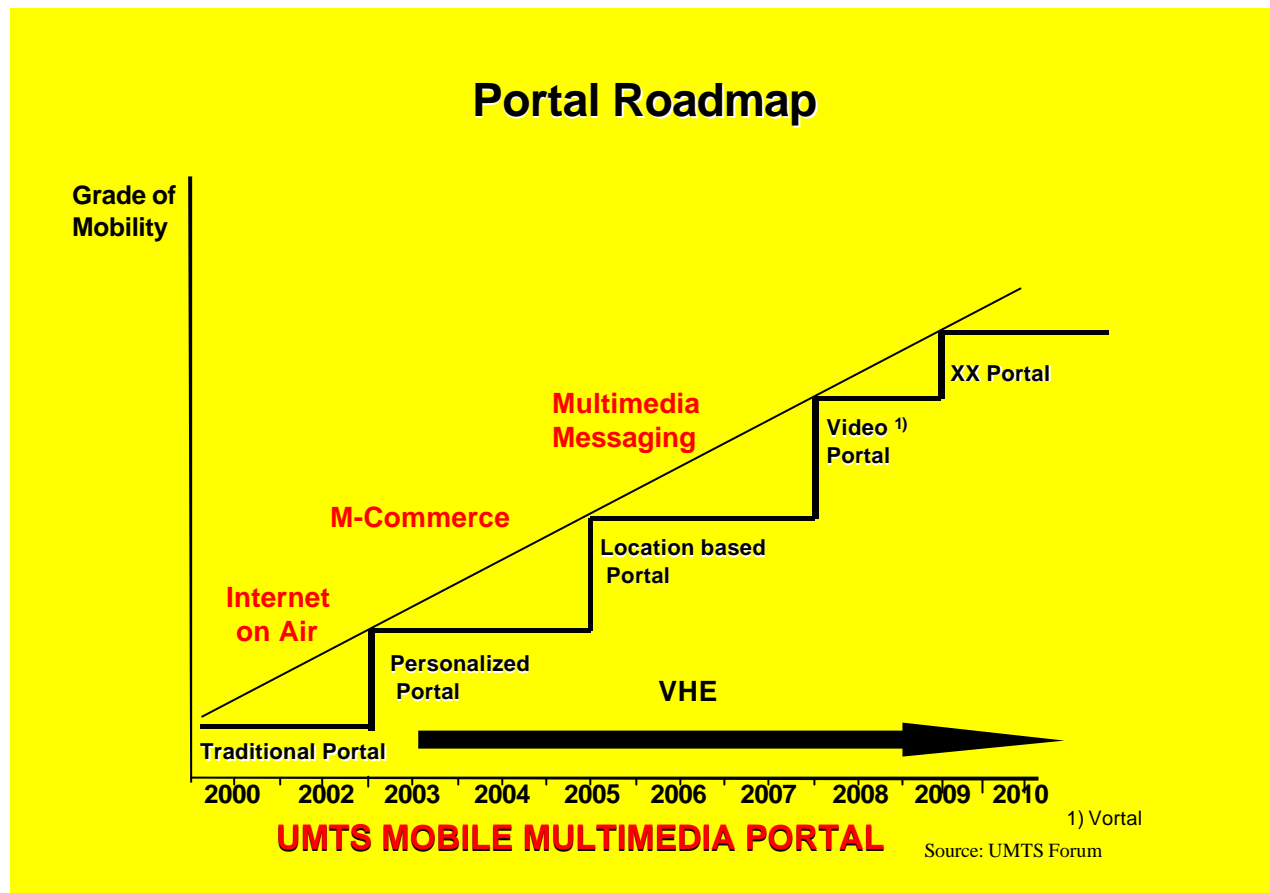


Figure 3.1: Portal Roadmap

- a) First of all, a traditional Portal has to provide the search engine and a pre-selected web page catalogue.
- b) The personalised Portal has to take into account user profiles and takes care about user-owned data base.
- c) The location-based Portal will search for user location-dependent data. The location information comes from the access network (non IN-based and IN-based).
- d) The video Portal will support the access to all media relevant information from the TV and radio broadcast sector.
- e) The XX Portal is a future item. It will care about users' needs, when they roam. It will provide environment specific information.

Video will become a dominant medium on the Web. Thus, video Portals will become important. Moreover, Portals let us access text-based information without understanding the language and meaning. Understanding the language requires deep semantics, while access may shallow semantics. Video Portals will be designed with shallow semantics to organize video data. This embraces search and retrieval within an environment with video facilities, offered through suitable communication channels (DVB etc.) The so called "Vortal" (vertical Portal) will focus on a particular subject e. g. books, CDs etc.

To accommodate the continuous enhancements by a phased approach, a Mobile Multimedia Portal platform is defined, which may include more functionality than today's Portals provide.

4 BUILDING THE FRAMEWORK FOR MOBILE MULTIMEDIA PORTALS

To enable the Mobile Multimedia Portal to be built and run, a platform must be prepared. UMTS - as a multi-service system - has to care about the provision of information-based services. Internet service provision is the basic function needed by the end-user to get access to Portal functionality and content. Each user has to be registered, and the protocol support needs to be determined (e. g. HTTP, SMTP, VTP). In the future "All-IP" UMTS network, this functionality will be an integral part of the access and transport network component. Tailored Internet-based services and Multimedia Service Provisioning will be key service areas.

4.1 Mobile Multimedia Portal Platform Requirements

The Mobile Multimedia Portal platform building blocks can be developed in various steps. The basic building blocks are shown in Figure 4.1.

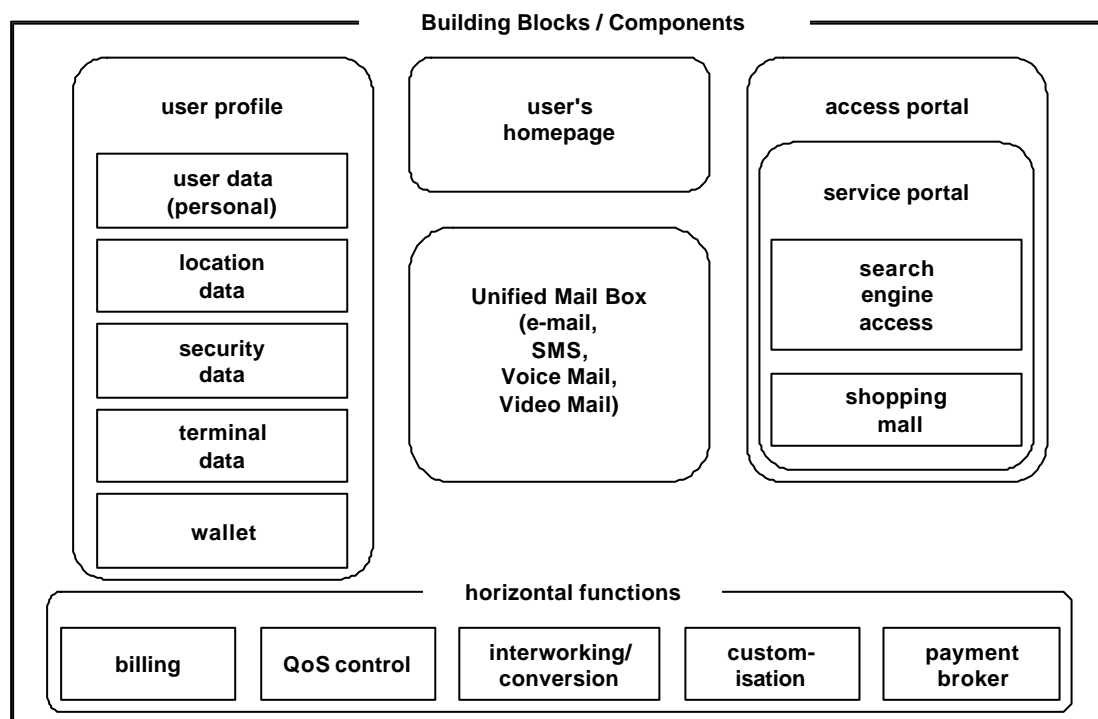


Figure 4.1: Mobile Multimedia Portal Platform Building Blocks

4.1.1 Development phases

The initial phase of the Mobile Multimedia Portal platform development requires basic functions like:

- Naming and address mapping
- Traditional Portal tailored to mobile users
- E-Mail
- Interworking with ITU-related speech services (VoIP), SMS service – from Unified Messaging to Multimedia Messaging
- Terminal Filtering (WAP)
- UMTS Operator web page for its own services (e. g. advertiser) and user web pages
- Access to other Portals

The second phase should add:

- Personalised Portal
- User profile management
- Support of customised Infotainment

The third phase should add:

- User profile management for roaming users (VHE)
- Content-dependent QoS control
- Push E-mail
- Location-based services

The fourth phase could imply:

- E-commerce/interactive
- Service portability: combination of IN/CAMEL/MEXE with Internet
- Content-dependent billing
- Location-dependent services for roaming users
- Intranet extension via UMTS (security, VPN ...)
- Video Portal

4.1.2 Requirements for Portal Set-Up

The role of a Portal can be perceived from the end-users' and from the Portal owner's perspectives. As the core business of a company evolves in time, Portals, especially if successful, might even be spun-off.

An End-user's Perspective

The end-user of a device using a Portal to obtain access to the information and value added services available will have some of the following expectations:

- Device & preference specific presentation of information
- Personalised service
- Best quality possible for device, unless overridden by preferences/choice
- Quality of service - cost, performance, graceful degradation of service, roaming issues (amount of info different to home network usage)

- Privacy & trust
- Single bill including m-commerce
- Awareness of cost, free with ads, subscription, premium pay per view etc.
- Expectation of support & associated costs
- Potential to add device applications & maintain them (firmware etc.)

The Portal Owner's Perspective

The owner of a Portal will, on the other hand, have different expectations:

- Branding
- Building & delivering personalised perspective
- Formatting to meet user & device requirements
- Trust
- Security
- Privacy
- Meeting legal requirements
- User behaviour monitoring (heuristics)
- Interface to provisioning

4.2 Portal Operation and Functionality

Fundamentally, in order to fulfil the end-users' perspective and the primary attributes of a Portal owner, the following steps need to be implemented.

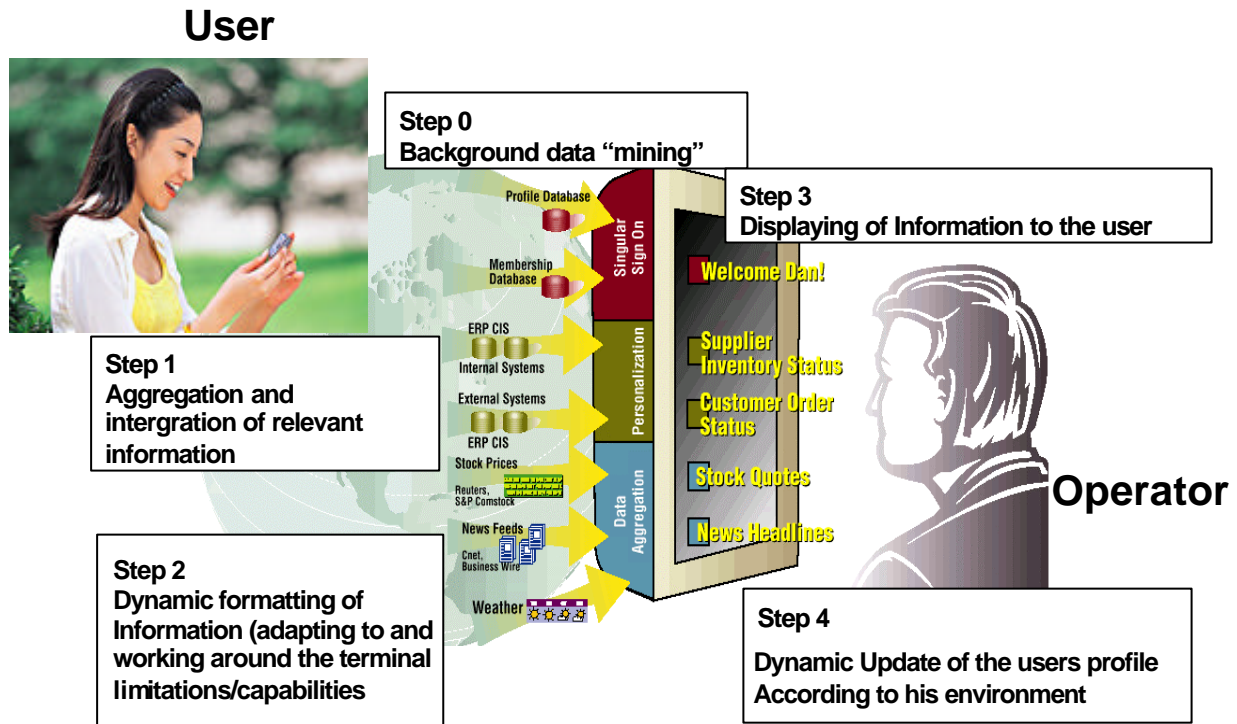


Figure 4.2: Portal Operation from the Operator's Point of View

4.2.1 Background Data "mining"

Upon login, and depending on their profile, the users are presented with a "standard" fixed template which reflects their preferences (clubs, links, ...). *Some of this information can be location dependent.*

Some restrictions might be imposed to the level of personalisation allowed by the Portal owner. Nothing prevents very targeted Portals, where the user will not have much "control", such as Corporate or m-Commerce Portals. In the case of Corporate Portals, with a different focus and a captive audience, security is the main issue.

Personalisation is seen as a major selling point of Portals. However, the level of personalisation is a function of the Portal's business model: certain Portals will not allow much personalisation as they provide free services; others will allow the user to bypass them altogether, even becoming a Portal of Portals.

Where appropriate, based upon the User active interests (sports results, stock warnings, breaking news, etc.), Intelligent Agents/Data Robots are launched to get and keep looking

for information of interest to the User. *Some of this information can also be location dependent.* This background exercise will be maintained while the user remains connected to the Portal, even if their session is suspended for any reason – an IP connection can be suspended, even indefinitely, and resumed later. (This raises the issue of paying for short latency information that cannot be conveyed to the user while they are unreachable, even if the information has been effectively collected on their behalf.) This process effectively feeds the Dynamic Update below.

4.2.2 Aggregation and Integration of Relevant Information

The aggregation of information has to take into account the user profile, particularly in the case where the user has access to some specific sources (account information to be included in the profile). How the Portal gets information will depend on actual contractual relations with information sources. This will be more critical if the information has to be paid for.

In terms of integration of information – making sense of all the information collected and preparing a synthesis for the user – a lot needs to be done. The users might provide their own “recipes” (e. g. CRAYON solution), the Portal might offer some pre-defined “templates”, or use might be made of Information Integrators (a new type of player, distinct from a Content Provider), offering such services.

The sources of information need to be properly indicated, somewhere and somehow. The Portal owner might or might not assume responsibility for the accuracy and timeliness of the information. However, the disclaimers should not occupy a lot of space and time.

The Portal should filter the retrieved information (find *not* search) to provide only relevant information, not to be intrusive or obnoxious. This also applies to Dynamic Updates.

4.2.3 Dynamic Formatting of Information

Current user devices have been designed mainly for voice services and support data. This calls for intensive and costly tailoring of information and content to meet the device requirements. By the time UMTS will face the mass market new generation of devices designed for data with voice capabilities will be on the market. Nevertheless, both devices will have to be supported in order to still convey information to the user, according to their preferences. There is therefore a requirement to adapt information to work around the limited capabilities of some terminals.

4.2.4 Display of Information

After collecting, filtering and integrating the information, it has to be dynamically formatted taking into account the device or type of terminal and the *available bandwidth*. The display characteristics will need to be taken into account in the session initiation process, and the Portal will adjust the information (transcoding) as required. As the user moves around, or the network characteristics change, transcoding agreements might have to be renegotiated during a session.

- Transcoding might raise the issues of unauthorised/unintended "manipulation" of information. Copyrights, watermarking, copying,... issues

The Portal cannot rely on a static solution. It has to be constantly updated to support any kind of interface and terminal developed by the market (using, for example, the CCPP⁶ from W3C or the User Agent Profile from the WAP Forum).

The Portal needs to be implemented in a modular manner, with a clear separation of content and layout, allowing the information to be adapted to the terminal. For this purpose, customer service is very important, such as a hot line, updated scripting, etc.

4.2.5 Dynamic Update

Modifying (or adding to) the basic, personalised version of the Portal, dynamic updating allows for news/sports/stock information collected by the background data "mining" process to be displayed in tickers, applets, new windows, etc.

The Portal should be careful, however, not to overwhelm the user with constant interruptions. The relevance of "interrupts" needs to be agreed with the user. The display of this information, except for its "random", dynamic nature will follow the same process outlined above. It must also be noted that there is a certain latency associated with each source, which must be accepted by the user.

⁶ Composite Capability/Preference Profile

4.3 Mobile Multimedia Terminals

Demand for 3G terminals is already starting to grow. In the next one to two years, 3G terminals are most likely to mimic existing designs and be based on voice-centric applications and supply access to the Internet via WAP or an IP-based micro browser. The 3G radio will most likely be the biggest difference, supporting higher speed data transmission. For Internet access, the early adopters will link their existing PDA or notebook computer to their phones for access to 3G applications. Just as devices that support MP3 for the audio market will soon be added to existing phones, as mobile audio streaming technology advances, specifically designed devices may become available to support these applications also. As more markets introduce 3G networks, led by Europe, we will begin to see more differentiation in style and design. Even in Europe, broad implementation of mobile Internet browsing is not expected before 2002 with the launching of 3G networks combined with the availability of browser enhanced 3G terminals.

But the move into 3G will happen quickly. The current average global replacement rate is close to 50%; meaning phones are replaced once every two years. We don't see the replacement average increasing much, except perhaps on a regional basis. But it is possible that the majority of users worldwide will be using 3G terminals by 2006 or 2007, making way for the fast adoption of 3G applications.

The idea of a phone or PDA today may radically change in just a few years. With numerous committees and standards boards focusing on the mobile and wireless space, and with the conjunction of computing and communications, we are seeing a rapid change in the way terminals are designed and used.

5 IMPACT ON STANDARDISATION

Global standardisation is of fundamental importance for mobile cellular systems and essential for worldwide roaming. This is a key issue for IMT-2000/UMTS. The framework standards for wireline and wireless access, for national and international telecoms infrastructures have been developed and agreed on the ITU level (the Framework Standards) and on the regional/national level (the Specifications).

The standards for the Internet have their roots in the development of the ARPANET and in the LAN area. They emerged to a global standard with the worldwide use of the Internet protocols in PCs and computers. IETF, W3C, ICANN and other IP-related standards organisations are working now to develop them towards mobile applications (mobile IP). These standards, which are coming from different roots, will be merged for UMTS.

Wireless access has already introduced a new set of standards and protocols that add a layer of complexity to application solutions that are not necessarily compatible with the Internet world. This has been seen with the introduction of Voice/Video over IP, WAP, i-mode and similar IP services to mobile networks. In addition, for data processing, data communications, TV and Multimedia ISO, IEC and ITC standards were developed and continue to be valid for all kinds of data and multimedia applications and services.

The following diagrams show the main difference in standardisation between IMT-2000 and UMTS in the context of the Extended Vision. Fig. 5.1 shows the standards associated with the IMT-2000 environment linked with the ITU-based fixed network environment. A series of network services are specified entirely in the ITU framework including service interworking, addressing, signalling and QoS standards. The typical configuration is the physical and logical connection from terminal to terminal or person to person. Voice is the dominating service, but data services are set up in the same way in these connection-oriented services. Billing of these services is generally based on the duration of a call.

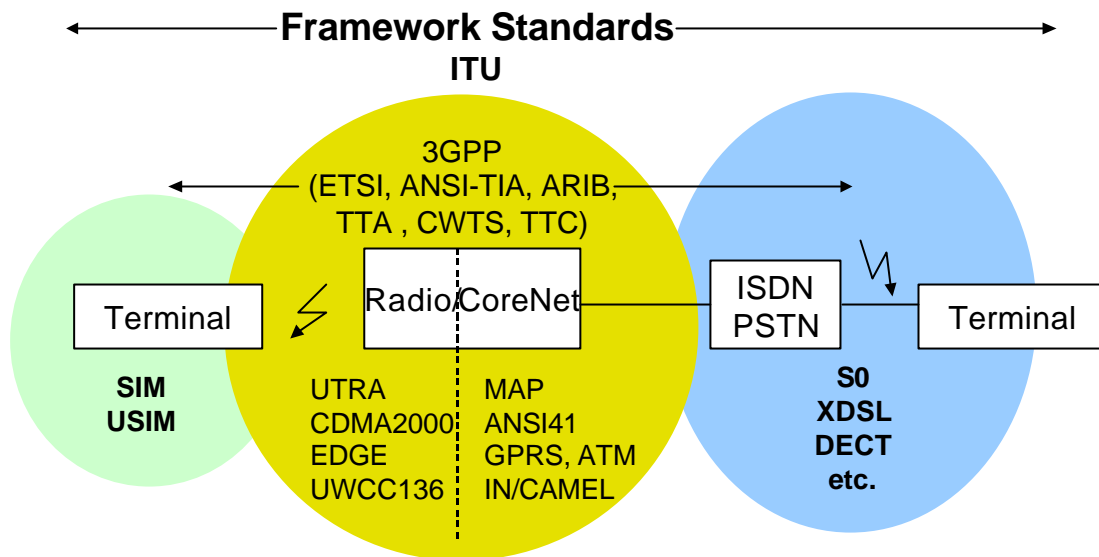


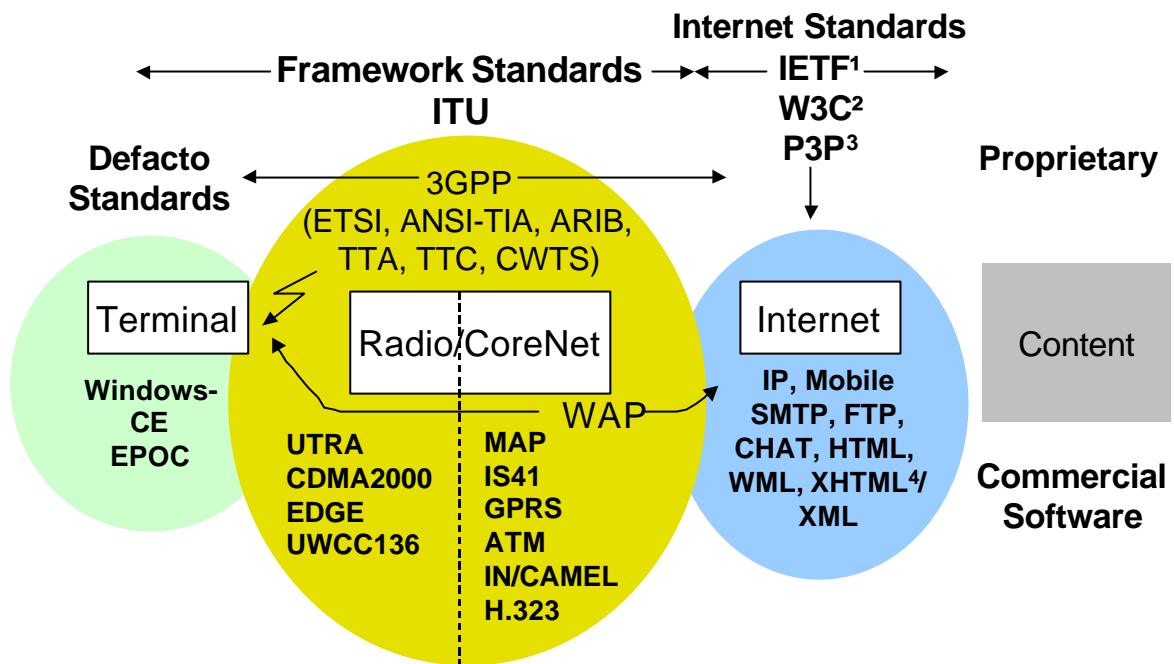
Figure 5.1: UMTS Standardisation Scenario in the Framework of IMT-2000

For UMTS these standards have to be supplemented for those services that will also be offered on the wireline network, such as bitrate harmonisation, circuit switched service interworking, etc. As an example, UMTS provides 384/128kbps transparent connections, whereas the fixed ISDN network only offers 64kbps and 128kbps in a limited way. Also, the harmonisation of terminal interworking characteristics between wireless and wireline terminals may be a standardisation issue for services such as video telephony, VoIP, fax and other telematic services. QoS, security and billing issues also have an impact on standardisation.

Fig. 5. 2 shows the scenario for multimedia services in the scope of the Extended Vision: IMT-2000/UMTS is linked with the Internet, the portal and content provisioning. The typical configuration, physically, is from terminal to computer or client to server. This is a "many to one" relationship, because there may be many physical terminals logically connected to one computer. "Connectionless Services" exist on a "user at host" basis. As UMTS will combine the ITU-related standards with the IETF, W3C etc.-related ones, it will be faced with a number of new interworking issues. These relate to quality, security, mobility management, billing, etc. A main issue is the interworking on the protocol layers where "Out-of-band" and "In-band" control functions have to be aligned. The standardisation also has to specify impacts regarding addressing (ITU, IP), which is quite different in IPv4 and IPv6. The Internet transition from IPv4 to IPv6 is not only impacting the Internet itself, but also UMTS. Thus, this topic will play a significant role in the future standardisation within 3GPP.

The harmonisation of the UMTS standards between IMT-2000/3GPP and the Internet impacts the Mobile Multimedia Portal platform as a workable solution in an international mobile environment, especially for the **roaming user**.

Push E-Mail is another issue. Standards have to be specified based upon the existing IETF SMTP protocol standard. Standardisation issues need to be discussed in the relevant bodies to guarantee end-user transparency and compatibility.



¹IETF = Internet Engineering Task Force, ²W3C = World Wide Web Consortium, ³P3P = Platform of Privacy Preferences

⁴XHTML = an XML version of HTML (new mark-up language recommended by W3C in early 2000)

Note: ISO, IEC, ITC standards are not shown

Figure 5.2: UMTS Standardisation Scenario UMTS/IMT-2000 with Internet

The role of the UMTS Forum in this area has been to widen the scope of standardisation in the way described above and to convert these views into requirements and work items. Another important issue is the compatibility with 2G systems, especially with GSM and the interworking with WAP. Work items need to be addressed to many organisations including 3GPP, the IETF and the IPv6 Forum.

5.1 Mobile Multimedia Portal Platform Requirements

The Mobile Multimedia Portal is located at the transition between the access and transport network and the content provision. The Mobile Multimedia Portal deals with the mobile user on the applications level, on top of the relevant protocols such as HTTP. In deciding how the Mobile Multimedia Portal should be standardised the areas of mobility and security are key. The use of mark-up languages including DHTML, XHTML/HTML, XML and WML must also be considered. Finally, the common set of Portal Roadmap rules discussed in Chapter 3 is important for the roaming user.

The 3GPP UMTS Release 99 is composed of the UTRAN attached to two separate UMTS core network domains: a circuit switched domain based on GSM *Mobile Switching Centers (MSCs)*, and a packet domain built upon *GPRS Support Nodes (GSNs)*. UMTS Release 00 will open the defined features for further evolution following GSM/Internet convergence.

In the following sections the main topics that will impact standardisation in the context of the Extended Vision are described in more detail.

5.2 Mobility

Mobility, in all its many forms, is becoming the watchword of our society. Everything moves faster and faster. IP seems to be the end to end protocol of the future delivery of most services since it will exist in the wireline and wireless world, in office extension environments and in home networks.

The interest in mobile IP as a potential mobility solution for cellular networks leads to a requirement to extend the existing protocol of telecommunication networks. As a network-layer protocol, mobile IP is completely independent of the media over which it runs, i.e. it is independent of technology. This is in keeping with the design philosophy behind the Internet Protocol itself, which was designed to be independent of the underlying characteristics of the links over which it runs.

Mobile IPv6 as standardised by the IETF benefits from the integration of ongoing development of the Internet and cellular standards. It allows the user to keep their home address while roaming because they are always "ON".

IPv6 mobility determined by and optimised for mobile terminals will be one of the major features in cellular networks. IPv6 provides transparent interoperability with core networks and it is simple and scalable to support billions of new user devices. Its key benefits are mobility, security, QoS, scalability and auto-configuration. It offers "Built-in" IPSec that provides all management applications security, it supports cellular and non cellular access, and its flexibility allows sharing of resources to support a diversity of both wireline and wireless technologies. It has no impact on location registers since the information required to route packets is managed independently from the information used to locate and authenticate a UMTS user.

The IETF is currently working with 3GPP to incorporate the UMTS requirements on terminal mobility into Mobile IPv6, to provide seamless wireless and wireline mobility management. This will offer the major advantage of optimized routing in comparison to second generation Cellular Network Roaming concepts.

Each mobile terminal is always identified by its home address, regardless of its current point of attachment to the Internet. While situated away from its home, a mobile terminal is also associated with a care-of address, which provides information about the mobile node's current location. IPv6 packets addressed to a mobile terminal's home address are transparently routed to its care-of address. The protocol enables IPv6 terminals to cache the binding of a mobile terminal's home address with its care-of address, and to send any packets destined for the mobile terminal directly to it at this care-of address. The first option in providing mobility functionality over heterogeneous networks is an interworking solution. Within the UMTS system, classical MAP-based mobility functions are exploited, while on the IP side, mobile IP can be used. In this situation a complete interworking function has to be developed to allow the user overall mobility across both the mobile and the IP environment.

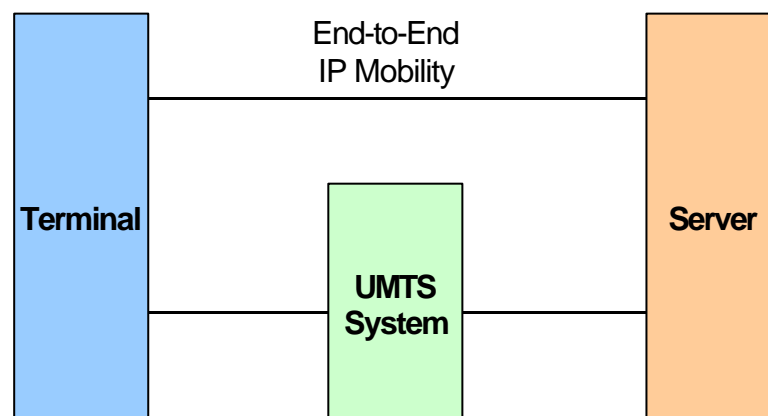


Figure 5.3: Transparent IP Mobility

Figure 5.3 illustrates a transparent IP mobility solution both within the UMTS system and in the IP environment, and will be implemented after the unique IETF/3GPP mobility support solution becomes available. In this case a transparent end-to-end mobility protocol is provided through the exploitation of integrated IP functions, i.e. mobile IP for the discrete macro-mobility, within and between Core Networks, and cellular IP for the continuous micro-mobility within the Access Network.

5.3 Security

Rapid advances in communication technology have accentuated the need for security in the Internet. The IP Security Protocol Working Group (IPSec) has developed mechanisms to protect client protocols of IP. A security protocol in the network layer is developed to provide cryptographic security services that will flexibly support combinations of authentication, integrity, access control, and confidentiality.

The protocol consists of three core components. The IP Authentication Header (AH) verifies the identity of a packet's sender and the authenticity of the packet's contents. The IP Encapsulating Security Payload (ESP) encrypts a packet before transmitting it, and may also encapsulate the original IP packet. It is independent of the cryptographic algorithm. The Internet Key Exchange (IKE) governs the transfer of security keys between senders and receivers. The preliminary goals of IPSec are to pursue host-to-host security, followed by subnet-to-subnet and host-to-subnet topologies. AH and ESP can be used with various authentication and encryption schemes, some of which are mandatory.

Protocol and cryptographic techniques have also been developed to support the key management requirements of the network layer security. The Internet Key Management Protocol (IKMP) will be specified as an application layer protocol that is independent of the lower layer security protocol.

IPSec gateways work only in tunnel mode, which means no part of the original packet is vulnerable to interception.

Some of the key IPSec features are:

- Signalling: integrity, authentication, anti-replay protection
- User traffic: integrity, authentication, confidentiality
- Visited network resources and traffic: access control, confidentiality
- No Foreign Agents
- IPSec protocols are integrated into IPv6 devices as standard
- Home Address Option eliminates network-ingress filter problems
- Route-optimisation functionality is integral

Similar to the mobility problem of providing complete and reliable end-to-end functionality across heterogeneous networks, security will follow the same approach.

3GPP is currently performing a conformance check of IPv6 and the different add-on components such as MIP, IPSec, Diffser, etc. It is expected that the necessary amendments will meet the requirements of a huge cellular market.

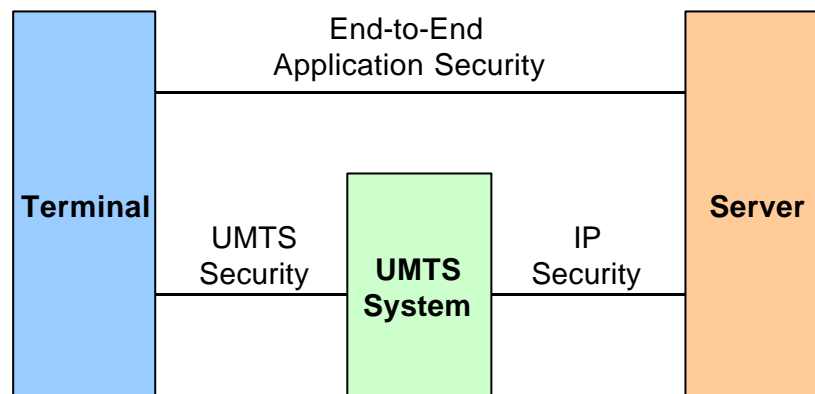


Figure 5.4: Security Relationships

Security relationships in a heterogeneous network environment can be very complicated, requiring both an interworked and a transparent end-to-end solution. In fact, dedicated mutual authentication and encryption facilities are used to check and secure the transmission segments in each specific environment, i. e. both the UMTS system and the IP segment. End-to-end transparent solutions are needed to secure the application layer, via mechanisms such as digital signatures plus non-repudiation techniques. Non-repudiation can be achieved by generating a signature and combining it with some form of user authentication data (such as a PIN). When the user commits to a transaction, the signature will ensure that they cannot deny later that it took place. Of course, this kind of functionality is fundamental in any kind of mobile-commerce transaction.

To guarantee the overall required level of security, global co-ordination is necessary between the solutions adopted at the transport layer and the solutions adopted at other layers such as the applications layer.

5.4 The UMTS SIM Card (USIM)

The key element of the subscription to a UMTS service is the USIM. In addition to the well-known functions of the GSM SIM card, the USIM adds UMTS-related extensions and provides compatibility for UMTS-GSM roaming. The issue of electronic money, used for e-commerce, becomes more valuable in contrast to debit cards today. Considering Internet-based services means that the USIM card needs additional functions, which deal with "In-band" control mechanism, identification, security and applications. Other future items will be secure and personal interconnectability with other end-user devices that could be linked with the UMTS terminal, e.g. via Bluetooth. The maximum number of devices that will belong to the end-user needs to be determined, as well as the scope of functionality regarding applications support.

5.5 Network Application Interfaces

The adoption of open interfaces for access to applications is another target of mobile multimedia standardisation. The "Open API" technology area is being studied and driven forward by the Parlay Group⁷. The architecture of the API is designed to enable a vast range of network functionality to be readily accessible. The Parlay API describes two sets of interfaces: **Framework Interfaces**, which provide for the common functions that are required to enable services to work together in a coherent fashion, and **Service Interfaces**, which provide for the common functions that deliver whole complex services or sub-components of services (micro services).

In phase 1 of the API, the overall areas of focus were authentication, event notification, integrity management, OA&M and discovery. Phase 2 will focus on expanding the scope of the API to include IP network control, mobility, performance management, audit capabilities and improved integrity.

Implementations of the specification will augment CTI by finally breaking down the barriers at the edge of the networks and allowing creation of less constrained services and applications outside of the network. Part of the goal is to allow applications external to the world's telecommunication networks to customise the interactions of these networks. This will enable the combined resources of the world's telecommunication networks, the world's "Enterprise" networks, the Internet, and even personal data networks to be brought to bear to provide services which could use communications functions including voice, video, data, etc.

Today's IN solutions have been designed to meet the needs of telecommunication Network Operators through protocols (not open APIs) within the network. The Parlay Group will provide specifications for an external API to support a wide range of external applications (e. g. from service providers) whilst maintaining the security and integrity of the network.

5.6 UMTS Specific Issues

Many of the issues that arise from this report are well known and understood in non-UMTS environments. However, some are new to UMTS, and some others may take on a new significance in UMTS.

In the preceding text, we have identified a number of issues where the specific issues relating to mobile networks come into play. The following are UMTS specific issues:

5.6.1 Addressing and Naming

If IPv4 systems are used prior to IPv6 implementations a UMTS specific issue arises. IPv4 networks will be self-limited and number portability will be prohibited. Each mobile user will need a unique address in a public and open UMTS environment, especially because of

⁷ Parlay Industry Working Group

national and international roaming. Thus, intermediate solutions need to be found, if there is no way in the start-up phase of UMTS to use IPv6. As a target, however, the whole addressing concept of UMTS should be IPv6-based.

UMTS Network Operators will need their own Internet addressing space for their network elements (GPRS, IN etc.) and for their users who have no home base in the fixed Internet. Thus, it is urgently needed to estimate the address space demand for the future mobile multimedia market. As an example, an estimation for the total amount of addresses for IMT-2000/UMTS are shown for the years 2005 and 2010:

	Mobile Users	Mobile/Fixed Users	
Domain Names/ Alpha-numeric addr. level (names)	Mobile Internet/ Intranet Domains gTLD ccTLD	ITU E.164 related Internet DLD's: INT.... (VOIP etc.)	Fixed Internet/ Intranet gTLD ccTLD
Numeric IP-Address - Capacity Requirement	Year 2005: 10 bio Year 2010: 50 bio	Year 2005: 10 bio Year 2010: 50 bio	Year 2005: 2 bio Year 2010: 4 bio

*Figure 5.5: Capacity Requirements for total IP-Addressing
in Future Mobile Networks (Source: Siemens)*

The conclusion of this first analysis is that Internet Domain Names, IP-addresses and E.164 addresses are a limited resource. Thus, timely advanced planning of this resource is of great importance for the industry. At this stage it does not matter whether the Internet Domain Names and Numbers for mobiles will finally be used either by an ISP, Portal Operator or the UMTS Network Operator. However, an early clarification of TLD naming, address reservation and structuring does need to be done.

5.6.2 Quality of Service (QoS)

Guaranteed QoS is a standard item in today's telecom business, whereas the Internet only offers QoS on a best effort basis to the end-user. This is a concern, as it will be virtually impossible for the user to distinguish any observed delays as being due to the Internet, as opposed to the air interface.

On the other hand, in order for the Network Operator to be able to ensure QoS, it will most likely have to pass the higher cost of a guaranteed QoS Internet access to the users. The Network Operator will also have to provide additional protocol support, and this will have to be compatible with the packet-based QoS transport specified in 3GPP.

The Portal Operator will have to be able to adjust to the varying (on demand) data rates requested by the user, depending on the application. Thus the Portal Operator needs to know the requested QoS, as well as the minimum acceptable QoS, to allocate the necessary resources.

Portal Operators and dynamic Content Providers have the ability to deliver, intelligently, relevant information to users based on a series of characteristics and capabilities. Quality of Service (QoS) as requested by the user and as delivered by the Network Operator is one of those parameters on which this intelligence can operate.

5.6.3 Security

Security, and the provisioning of user equipment for USIM-based authorisations and services, will take on new significance when linked to portal profile management. One of the advantages that UMTS will bring will be the flexibility of billing engines, which will allow various services and delivery options at differing tariffs. Thus, the billing for services, when that service is provided to a portal not co-located within the network billing infrastructure, will require integration and the corresponding interface or data exchange to enable this. The Network Operator will also need to be aware of the issues concerning ownership and copyright of the service or information.

6 REGULATION IN A CONVERGENT MARKET ENVIRONMENT

6.1 Background

At present, in most countries of the world, the telecommunications, broadcasting and IT sectors (i. e. vertically independent sectors) are regulated separately. In a converged environment the question arises whether this approach is well suited to foster competition, innovation and the provision of services. A more horizontal approach seems to be more suitable whereby all sectors have the same infrastructure regulation, which is technology and sector neutral and relying upon competition law, to prevent parties abusing their dominant position in provision of services.

Wherever regulation is in place, it must be applied in a workable and timely manner. The global nature of IMT-2000/UMTS combined with sector convergence points to potential difficulties of enforcing the rules of one country in other countries. Furthermore the rapid pace of change in terms of services and products, measured in months and weeks, presents a real challenge for anyone seeking a legislative solution to any particular problem. Pragmatic international solutions need to be sought.

6.2 The Three Converging Worlds

6.2.1 Telecommunications Today

The transition of telecommunications from monopoly to effective competition is a global trend. The World Trade Organization (WTO) lead the way in its Global Agreement on Trade in Services (GATS) and Basic Telecommunications Agreement (BTA). These agreements do not cover broadcasting and only apply to telecommunications services. Thus they do not cover any "content services" which may be transmitted through telecommunications services.

In most countries the current telecommunications regulatory framework is based on the following paradigm:

- A dual relationship with two basic types of actors, an operator and a customer. The emergence of added value services, or Internet services are creating a different situation, but this new paradigm is not yet the basis of current licensing regimes.
- No regard for value of information: The transported information either has no recognised "market" value (typically, somebody else's voice) or the telecom operator is not informed of this value and therefore behaves transparently to the objective value of this transported information (e. g. one person providing another with a piece of information which represents money to the receiving person).

Because telecom networks were traditionally mainly used for the provision of voice telephony services, regulators did not have to deal with content. The regulators ensured the fair distribution of scarce resources allowing service provision (frequencies, numbers, sometimes rights of way and sites), the communication between operators (any-to-any

interconnection), and on certain occasions a certain Quality of Service (QoS) to the customer⁸.

However, the variety of services provided over telecoms networks has increased dramatically. The content transported is far more diverse and valuable. A customer is tied to a specific access network, where the network operator has full control of most of the services (especially Value Added Services), since they are provided either directly by the operator or under its conditions and control. The customer can often get access to other services only by changing access network, if an alternative one is available.

A framework of sector specific rules has been constructed during the past decade in the European Union (EU) to liberalise the telecommunications sector and make the transition from monopoly to effective competition, following the global trend. A key objective of this liberalisation was to limit regulation to the minimum required to secure the overall public interest and to enable effective market entry and sustainable competition.

6.2.2 Broadcasting Today

The current broadcasting or audio-visual regulation is dealing with the distribution of such services. Access to broadcasting spectrum, and right-of-way for cable networks, are two important points. The regulation of content is generally either an obligation to fulfil e. g. provide a balanced range of programming or to limit certain types of material e. g. incitement to racial hatred. The former is often met in practice, to varying degrees from one country to another, by broadcasters vested with a public service mission.

The transported audio-visual information has a recognised value and this results in more types of players: in addition to content producers or programme makers, there are terrestrial radio and TV broadcasters, cable operators, satellite operators, and providers of packages of terrestrial and satellite channels. Regulators usually intervene early in the process when frequencies are involved.

Very often the criteria for choosing operators have been based on content at a societal level: openness to various opinions, freedom of speech, quality of programmes, cultural policy, etc.

Audio-visual regulation is largely national in scope, although within the European Union, action has been directed towards achieving the free circulation of services through a *Television Without Frontiers Directive*⁹. This co-ordinates national regulations in a number of areas relating to the provision of broadcast services (jurisdiction criteria, advertising, sponsorship, tele-shopping, protection of minors, public order, right of reply, promotion of European programmes). The main principle of this binding Directive is the principle of "home country" control, i. e. control by the authorities in the country of origin under whose

⁸ QoS in a broad sense, including e. g. coverage, protection of correspondence, etc.

⁹ Directive 97/36/EC of the European Parliament and of the Council of 30 June 1997 amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities.

jurisdiction the broadcaster falls. It has proved its effectiveness in the current broadcasting environment where countries are required to ensure that broadcasters within their jurisdiction meet the minimal rules laid down in the Directive, but may decide how such obligations are to be implemented at national level.

Furthermore rules concerning copyright and rights related to copyright, applicable to satellite broadcasting and cable retransmission have also been set up to help create the legal framework for a 'European-wide audio-visual area'.

6.2.3 Information Technology Today

The Information Technology and software industries have no history of sector specific regulation as traditionally found in the broadcasting and telecommunications industries. However horizontal rules relating to issues such as export controls, electrical safety, electromagnetic interference, and consumer protection do apply, as would general competition law.

The Internet is more closely associated with IT and software industries than with telecommunications, even if it uses the same infrastructure. The organisation, management and allocation of resources within the Internet has been largely led by industry and large users such as government agencies, research institutions and universities.

In general the terms on which access is granted to networks, to conditional access systems, or to specific content is a matter for commercial agreement between market actors. Also arrangements made between content providers, rights owners and content carriers are settled by commercial agreement.

6.3 Regulation in the Converged Marketplace

6.3.1 Sector Specific Regulation (Vertical) vs Horizontal Regulation

A key feature of a converged environment is the possibility that any network can be used to deliver a much wider range of services than is currently the case. The fact that the network can be the same for all services does not mean that the services are the same, nor that the public interest objectives underpinning regulation automatically are the same from one service to another. For example whilst a film, a song, a spreadsheet and telephone conversation may all be carried in digital form, they are very different in terms of how consumers access and use them. Therefore, there are reasons why regulators may want to keep different regulatory approaches to each of these services, even if they are based on similar general principles.

However, continuing to regulate essentially similar services differently on the basis of the technology used to deliver the service does not make sense and could present discriminatory treatment which might hold back competition, investment and provision of services. One example is the current interconnection regime in Europe, where telecommunications rely on regulation to give interconnection rights to an organisation operating a public telecommunications network, while broadcasting networks get it on commercial conditions. Interconnection between the two will be of increasing importance in the context of services which use broadcasting media to download information and services, but rely on the telecoms network to provide a return channel. The rights and obligations of today's existing sector specific regulations were drawn up for a range of service definitions but over time they may fail to match the nature or range of services which are available and assume a conjunction of particular services with specific platforms which may not apply or be appropriate in the future.

In summary, on one hand there are those who are of the opinion that the current vertical approach to regulation provides a high degree of certainty for most market players and that the divisions between the markets are normal divisions which any company would encounter when operating across a number of sectors of the economy. On the other hand there are others who believe that these divisions between the markets form barriers and that these hamper the current technological and market trends. According to this view, a single regulatory model for all sectors within a converged environment, based on common principles, but with specific rules for specific services would apply.

What all agree is the necessity to manage scarce resources, such as spectrum and in some cases right of way. However, when the service is becoming independent from the access network, a unique scarce resource regime is necessary so as not to introduce discrepancies or unequal treatment among the various types of access networks. Therefore regulation should be kept to a minimum necessary.

With the global reach of content via the Internet, satellite and in the future IMT-2000/UMTS there is a clear need for international solutions to a key number of issues such as security, intellectual property rights, privacy and cybercrime. It is therefore important that the process of international dialogue is reinforced with the aim of reaching agreed solutions as and when problems arise in conjunction with technological, social and industrial developments.

6.3.2 Competition Rules

Competition legislation is one main tool to ensure fair business practices following a move from sector-specific regulation. In a converged market place, competition rules are a practicable approach to resolving issues between different market sectors which historically have been subject to different regulatory intervention. This is mainly due to the fact that competition policy concepts are reflecting a vast experience in applying the same concept to different markets. Thus competition rules need to be able to address new emerging markets where players are of very different sizes, including strong vertically-integrated incumbent operators from the telecommunications, audio-visual (principally broadcasting) or IT/software industries building on their traditional strengths and financial resources. Issues that could be expected to arise across these different sectors include bundling of content and services or of network capacity and services, predatory pricing, cross-subsidisation and control of essential facilities.

In conclusion, regulation needs to ensure that any customer may reasonably access any information and service. In other words, avoiding unnecessary market constraints and fragmentation.

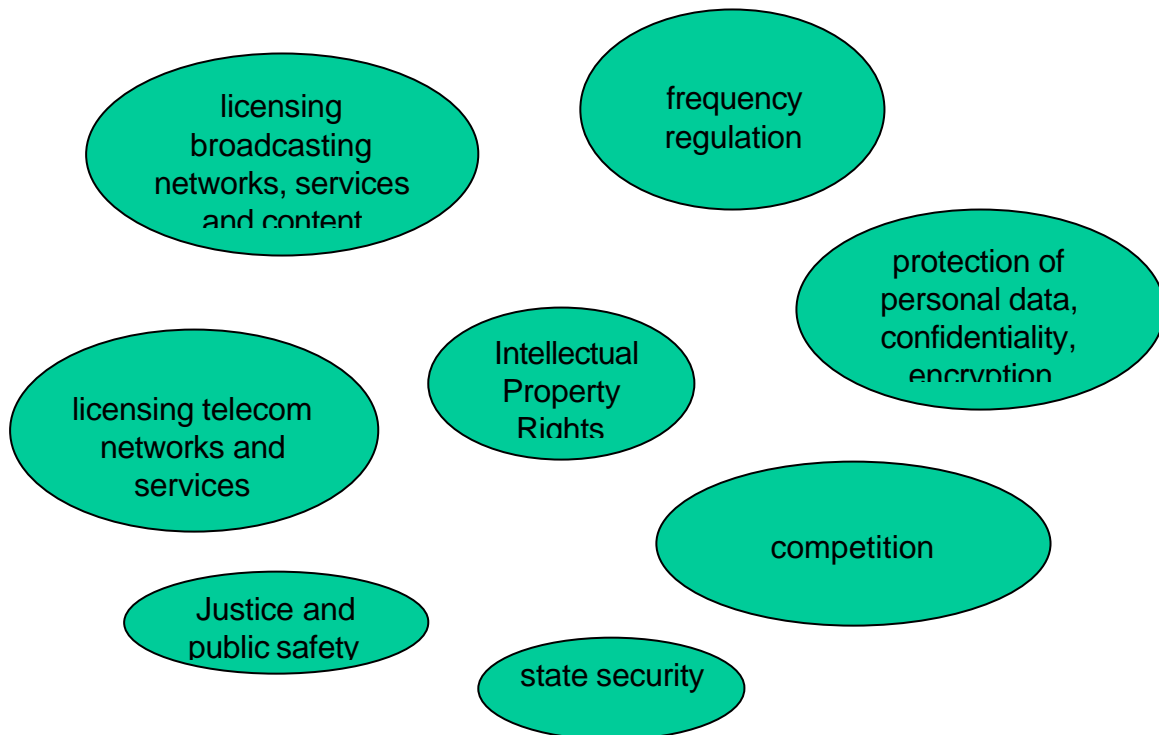
One tool that regulators could envisage is the separation of operations into different legal entities or even forbidding common ownership of entities (divestiture). The European Union has imposed separation of legal entities of dominant telecommunications networks and dominant cable TV networks where both are owned by the same company¹⁰. The case of sending TV content services through a wide-band network such as IMT-2000/UMTS, which is not a cable network, however, seems not to be covered.

Obviously this appears to contradict the idea of convergence, but convergence of already dominant entities can create new market obstacles. This is true not only for network provision but also for the bundling of networks and content provision. However any such regulation must be kept to the minimum necessary to achieve working competition.

¹⁰ Commission Directive 1999/64/EC of 23 June 1999 amending Directive 90/388/EEC in order to ensure that telecommunications networks and cable TV networks owned by a single operator are separate legal entities.

6.3.3 When is New Regulatory Intervention Needed?

In most countries, regulatory authorities exist to cover all the traditional market sectors to protect the public interest and can be identified as falling within the following categories:



All market players need to recognise and work within this framework of existing regulation, irrespective of their sector origins. Convergence will mean that different regulatory regimes may be applicable to the same cases. If any players foresee or discover a problem in the development, deployment or operations of systems and services in this converging world, and if this problem is really intrinsic to such systems or services and likely to occur systematically, whether it is a technical problem, or refers to competition or privacy, etc., then they should consider the questions below:

A - Is there a solution to this problem? (e. g. a technical solution or a standard arrangement between involved parties.)

B - Is the market likely to find its own timely solution within existing regulatory frameworks?

Then this is the preferred route. If not

C - Can authorities help by non-mandatory action: funding/promoting standard development, funding/promoting technical development, acting as a mediator or issuing competition/commercial guidelines, or by using existing regulation, e.g. competition regulation? One possibility is that authorities threat to take compulsory measures if industry does not find a solution.

If so, this route should be pursued. If not

D - Can authorities help by some new special regulatory provision (i. e. is it possible legally, practically, politically, etc.)?

Drawbacks and costs of the regulatory action should of course be evaluated and compared to its expected benefits.

In summary, Regulatory authorities should have an interest to introduce new regulation in a converged telecommunications/broadcast/IT market only when necessary and when the problem seems unlikely to be solved effectively by commercial players alone.

6.4 Ensuring Privacy and Data Protection

In order for convergent services to develop, users need to be assured that their privacy is adequately protected and, in particular, to have confidence in the security of information passed over the networks they use. Where location-based services are used appropriate safeguards for personal data and privacy protection need to be implemented.

An agreement on privacy and data protection has been signed between the USA and the EU, but many other countries have no regulation or only a limited privacy and data protection regime in place. Legislation has already been agreed at the European level in the form of legally binding directives, which i. a. prevents transfer of personal data to countries that do not provide equal levels of protection for such data.

Regarding personal data and privacy protection, a distinction has been made between the following two cases:

A - Legal limitations to the processing, sale and use of personal data which have been knowingly provided by the relevant individual (e. g. at the desk of the collecting company, by filling out and mailing a form, or filling out an Internet form).

In such cases, individuals easily understand that the collecting organisation intends to processor use these data because such processing or use is necessary to enable the collecting entity to fulfil its contract with the individual (delivery address, bank account details for transfers, etc.), or to comply with legal obligations.

This is why the restrictions to the processing and use should not be very stringent in this category. The collecting entity should within the existing law also be allowed to disclose or sell the data to other organisations, provided it has obtained the consent of the individual in question beforehand.

B - Limitations to the processing, selling and use of personal data which have been collected or generated unbeknown to the relevant individual. This is often the case in communications services in general and particularly in the IMT-2000/UMTS case. Mobile systems permanently track terminals and generate personal location data. IMT-2000/UMTS systems will also be technically capable of keeping a record of the information, or type of information, accessed by users, and generate individual information profiles. Furthermore,

IMT-2000/UMTS will be a vehicle of e-commerce and personal money transfers, payments, or personal purchase profiles could be recorded or constituted.

In order to be a success, IMT-2000/UMTS must be trusted by consumers and should not generate personal data and privacy situations that are not explicitly or knowingly created or allowed by IMT-2000/UMTS users. Therefore, all the processing, storage, use and sale of the above data generated in IMT-2000/UMTS systems must be strictly limited to what is necessary to communicating, billing and what the user has knowingly accepted after being thoroughly informed of all the implications of IMT-2000/UMTS capabilities.

The above constraints should not be limited to the infrastructures of the four or five large nation-wide public IMT-2000/UMTS networks of each country, but should be extended to all IMT-2000/UMTS sub-systems and local extensions, LANs, private networks, financial terminals/servers, etc. even when they are located in private premises.

An adequate protection of such data exists in some countries, but in others such protection is lacking or is inadequate. The global nature of IMT-2000/UMTS makes a more comprehensive approach necessary to these problems.

6.5 Access to Content

6.5.1 Constraints Arising from Commercial Agreements

Possession of rights to key content, such as major sporting events, may give market players particular commercial power, and this is where the application of competition rules will need to prevent abuse of dominant positions. Exclusive agreements between content providers and content carriers as a result of convergence may be seen to limit consumer choice by excluding access to content provided by competitors.

Alternatively convergence may have the effect of dissolving access bottlenecks. IMT-2000/UMTS will provide an alternative high bandwidth channel suitable for distribution of e. g. video programmes. The exclusive distribution rights awarded to cable television companies may no longer lead to a dominant position at service level. Cable companies are likely to compete with IMT-2000/UMTS operators, digital satellite and terrestrial television broadcasters and fixed access network providers.

6.5.2 Intellectual Property Rights

In the future it will be possible to download music and other items protected by intellectual property rights immediately from a IMT-2000/UMTS network at any place and any time. It is questionable whether intellectual property rights can be safeguarded in such an environment. At an international level the World Intellectual Property Organization (WIPO) is in the process of adjusting the international legislative framework to facilitate e-commerce through the extension of the principles of the WIPO Performances & Phonograms Treaty to audio-visual performances. WIPO also works with the adaptation of broadcasters' rights to

the digital era and is progressing towards a possible international instrument on the protection of databases.

The question remains as to whether the rules will be able to be enforced, and to what extent.

6.5.3 Public Service Broadcasting

Public service broadcasting is distinct from commercial telecommunications and Internet activities as it is primarily funded by public money. The public service responsibility entrusted to public service broadcasters is recognised as of cultural importance and the organisations charged with this responsibility have a right to appropriate funding. Such rules may remain justified also in the digital broadcasting environment.

Within the European Union, countries continue to impose 'must carry' obligations on network operators, requiring them to carry specified radio and television broadcasts as part of their public service broadcasting remit. Such rules should be applied only in order to achieve specific public interest objectives. All network operators subject to such rules expect reasonable remuneration, taking into account the non-profit nature of public service broadcasting, and the value of these broadcast channels.

Convergence may, however, enable many more sources of audio-visual information to be accessed by viewers. Public authorities will need to monitor on a continuing basis the extent to which desired policy objectives are being achieved by normal market activity, including the impact of other media, and whether as a consequence, regulatory obligations placed on broadcasters may be lightened.

Technological convergence offers public broadcasters new opportunities, in terms of both activities and potential means to have access to customers. The regulatory framework should allow broadcasters to take advantage of these new opportunities in a commercial framework and in competition with other market players. It should also permit them to benefit from economies of scale and scope since this also brings benefits for the consumer. However, such commercial activities must be kept strictly separated from state-subsidised activities.

6.5.4 Harmful and Illegal Content and Protection of Minors and Public Order

While public interest objectives relating to the protection of minors and public order have traditionally been recognised in for instance the USA and the EU, both at national and Community level, these have not been recognised in all countries of the World. As the IMT-2000/UMTS network will be global, content which is unsuitable for minors or which disrupts the public order could be available to anyone, anytime and any place.

The above also applies for other harmful and illegal content. It is extremely difficult to enforce safeguards in the context of harmful and illegal content on the Internet. The global nature of the platform and the difficulty of exercising control within a given country are leading to solutions which draw on self-regulatory practises by industry rather than on formal regulation, allowing parents and other guardians to take greater responsibility.

As there is still not sufficient co-ordination at an international level concerning these matters the result is that the same problems are being solved in different ways in different countries. In the United States for example the High Court of Justice decided that an Internet provider is a post office and that it is therefore not responsible for the content of web-sites and newsgroups. The court in the UK, however, considers an Internet provider a publisher. This implies that publishers are obliged to take reasonable steps to prevent the publication of offensive material or have such material removed.

6.5.5 Emergency Calls and Public Safety Broadcasting

National authorities may request telecommunications operators to process emergency calls in all circumstances. In the USA, federal regulation establishes the emergency number 911 and the responsibilities for the network operators associated with it, e. g. mandatory location within mobile networks. Within Europe, a 1991 Council Decision¹¹ established the emergency call number "112" and included mobile networks. For instance, it is possible to make emergency calls within a GSM network without a roaming agreement or a subscription (i. e. without a SIM card), although the provision of this feature is subject to national regulation. Also in Europe mandatory location is being considered.

The emergency call constraints will be maintained insofar as they represent voice calls. A new question is determining if broadband emission from the calling party (e. g. using the video camera incorporated in the terminal), or reception by the calling party of broadband messages (e. g. video instructions from emergency organisations) should be made mandatory, and under what conditions. If a broadcasting function is technically included in IMT-2000/UMTS systems there may be a demand by regulators to broadcast public safety emergency warning messages. Such responsibilities already rest with public service broadcasters.

6.5.6 Legal Interception and Legal Location

National authorities usually have the right under the terms of regulation or licensing conditions to order public operators to provide legal interception under certain circumstances. Within Europe, a resolution document IUR 1995 (International User Requirements) gives guidelines for this and similar instruments exist in the United States and elsewhere.

Legal interception schemes will be required in the future as for today. In this respect, including these features in the standards will lead manufacturers to implementing them in normal commercial versions of their systems, and therefore to reduced costs as compared to mandated a posteriori developments.

¹¹ Council Decision (91/396.EEC) of 29.07.1991 on the introduction of a single European emergency number. The Licensing directive 97/13 opens the possibility for national regulators to impose the provision of emergency services to telecommunications networks whether under individual licenses or general authorization (Annex, Section 3.4)

However, in order for this to be feasible regulators will need to identify their requirements at an early stage.

As regards legal location of a mobile (location mandated by authorities even when the user has inhibited the location features related to his mobile), the logic is the same as in legal interception, and standardised tools will reduce the costs.

6.6 Global Circulation

6.6.1 Present Regulation and Direction

Over the last decade, world-wide travel has continually increased, and with the widespread implementation of 2nd generation GSM networks in more and more countries, some with penetration levels reaching up to 50 % or more, this has lead to substantial use of personal mobile phones by travellers wherever a compatible network and a roaming agreement is available.

Since each country has the sovereignty over the frequency use in its own territory, as well as over the approval requirements of the radio terminals and in principle, this could have lead to regulatory or even practical complications. However, the majority of the GSM type approval requirements were based on the same detailed test requirements, which were established during the initial deployment. Consequently, regulatory authorities all over the world granted foreign visitors permission to freely carry and use their GSM equipment. This pragmatic approach was a result of local commercial pressures and there was no formal regulatory agreement to achieve this “global circulation of terminals¹²”. Only very few states occasionally confiscated terminals on the grounds of suddenly requiring special licences or individual taxes.

With the imminent launch of IMT-2000/UMTS services, a number of international groups have studied possible new requirements resulting from the additional capabilities of personal terminals. For instance the use of multi-mode terminals can be expected to increase considerably. Currently studies are underway within the ITU-R Working Party 8F regarding Global Circulation of IMT-2000 terminals, and has been supported by additional studies and contributions by the ERC, UMTS Forum, and the 3GPP Market Representation Partners. This work on Global Circulation is being undertaken while also recognising the advances being made with regard to Global Roaming by national regulators as well as groups such as the GSM Association.

¹² Definition: “Global Circulation of Terminals” should be used as a term for all terminals/piece of equipment that are allowed to be freely carried and used – but not traded – world wide [12].

The provisional requirements to fulfil the Global Circulation of personal terminals are already becoming clear and a High Level Statement on Global Circulation has been published which states that the UMTS Forum...

...adopts the following principles:

The circulation of IMT-2000/UMTS terminals intended for personal use should be exempt from all customs duties or other official charges.

The personal use of IMT-2000/UMTS terminals should require no individual licence or any other form of individual formal regulatory procedure.

IMT-2000/UMTS terminals shall not cause unacceptable interference in any country where they circulate. One way of achieving this is the application of the receive-before-transmit principle.

IMT-2000/UMTS terminals shall comply with unwanted emission limits.

Authorities should co-operate in order to enable global circulation of such terminals in all parts of the world.

...recommends that

all concerned authorities subscribe to the principles listed above which will enable individuals to carry their personal mobile terminal into the country and to use it, subject to normal connection requirements,

regional telecommunications organisations, such as CEPT, CITELE, APT, and others, assist their members to implement these principles as expeditiously as possible in advance of the planned introduction date for IMT-2000/UMTS systems,

the ITU, the World Trade Organization, and the World Customs Organization take the necessary initiatives and start actions to achieve the international co-operation needed for truly global circulation of IMT-2000/UMTS terminals.

The UMTS Forum is continuing the studies on Global Circulation in association with other interested parties in order to progress the work in 3GPP and the ITU-R WP 8F.

6.6.2 Impact of the Extended Vision on Global Circulation

Will the emerging requirements and arrangements for IMT-2000 Global Circulation meet the new requirements arising from convergence and the Extended Vision of UMTS?

Present and past work on Global Circulation has focussed primarily on telecommunications-related regulation, and the Extended Vision clearly embraces broadcast-type and internet services which could perhaps raise conflicts in some jurisdictions. It is already known that some regulatory adjustments are required as a result of telecommunications and broadcast convergence but these have not generally addressed the personal terminal aspect.

Beyond this, however, is the fact that in the future electronic Information Society, personal terminals may be far more than just a multimedia communication device: for example it may contain electronic money, and have critical personal information such as that relating to travel documentation or even health and medical treatments. Electronic terminals or smart card devices may totally replace today's paper or plastic personal documentation. In these

rather advanced scenarios, inaccessibility would not just be an inconvenience but a denial of access to finance and critical personal services.

6.6.3 Extension of Global Circulation Concepts

It is already well accepted that mobile terminals will become ever more critical personal property and thus visitors must be free to carry IMT-2000/UMTS mobile phones with them into foreign countries all around the world without any restrictions when crossing borders, etc. Visitors should also be permitted to operate these mobile phones immediately on arrival on a legal basis.

It would therefore be premature to conclude that Global Circulation arrangements need to be extended as a result of the Extended Vision. The present studies on Global Circulation have shown there should be relatively little action required in many countries provided the appropriate approach is adopted, and many countries are making good progress in streamlining the regulatory environment to meet market pressures and obligations for international trade.

It is self-evident that the mobile phones will comply with health and safety rules in the interest of its user, and that roaming agreements and commercial aspects of the usage of hosting networks should not be subject to the global circulation agreement but should be left to normal commercial arrangements.

A future step would be to arrive at a more global acceptance of the principle of Suppliers Declaration of Conformance.

⁸ QoS in a broad sense, including e. g. coverage, protection of correspondence, etc.

⁹ One can imagine an intermediate stage between E and D, i. e. authorities threatening to take compulsory measures if industry does not find a solution.

¹¹ Council Decision (91/396.EEC) of 29.07.1991 on the introduction of a single European emergency number. The Licensing directive 97/13 opens the possibility for national regulators to impose the provision of emergency services to telecommunications networks whether under individual licenses or general authorization (Annex, Section 3.4)

¹² Definition: "Global Circulation of Terminals" should be used as a term for all terminals/piece of equipment that are allowed to be freely carried and used – but not traded – world wide.

7 BUSINESS PLAN GUIDELINES

7.1 Traditional Business Strategies

A traditional wholesale approach to corporate and residential customers restricts the opportunities for today's mobile operators in both segments of the market. A pipe-only, wholesale strategy means that operators simply connect customers to the existing Internet. From a business perspective, providing only access and transport means:

- the operator can compete merely on the basis of transport price, since revenue streams are limited to access and transport capabilities
- with number portability the customer can increasingly substitute one carrier for another
- service offerings carry the brand(s) of other providers and competitors
- other providers "own" the customer by controlling the end-user profile and records.

7.2 Expanding the Possibilities

When discussing potential business relationships within the Mobile Multimedia Portal context, various business models can be considered. These models focus on the roles of the mobile access Network Operator, the Internet Service Provider (ISP), the Portal Operator and the Content Provider.

Fragmented Model:

In this model the roles remain separated. It may be difficult to satisfy the end-user, due to the lack of harmonisation and control between the independent functions.

Partnership Model:

The main roles (Network Operator, ISP, Portal Operator) are maintained in a co-operation. Co-operation agreements will be necessary to achieve acceptable service offerings to the end-user.

Ownership Model:

This model combines the main roles within one owner. Clear responsibility lies with the operator to provide end-user services.

Of course, the Ownership Model has to allow additional partnership and/or additional service offerings from independent providers, such as end-user access to other Portal Operators and Content Providers. For a better understanding, the following description considers two alternatives through which the user can access content.

7.2.1 Fragmented Business Model

In Figure 7.1 the scenario where all the roles are kept separate is depicted. In this situation, all the subscription and security data related to all of the involved operators and providers should be stored on the UMTS operator USIM to simplify user access. Agreements would then be needed between all companies that play different and separate roles in the business value chain.

The user will need to register with at least three different companies: a UMTS Network Operator, an Internet Service Provider and a Portal Provider, to be able to access and manage content. In this situation, the Internet becomes the most likely interconnection network between the different operator and provider domains. This means that the parties involved can choose a completely different way of handling mobility, QoS and security. On the other hand, one important segment of the transmission connection, i. e. the Internet, cannot be controlled at all, being outside the reach of all the operators and providers. In the case of location-dependent services, forwarding the user location information goes against technical and legal conventions.

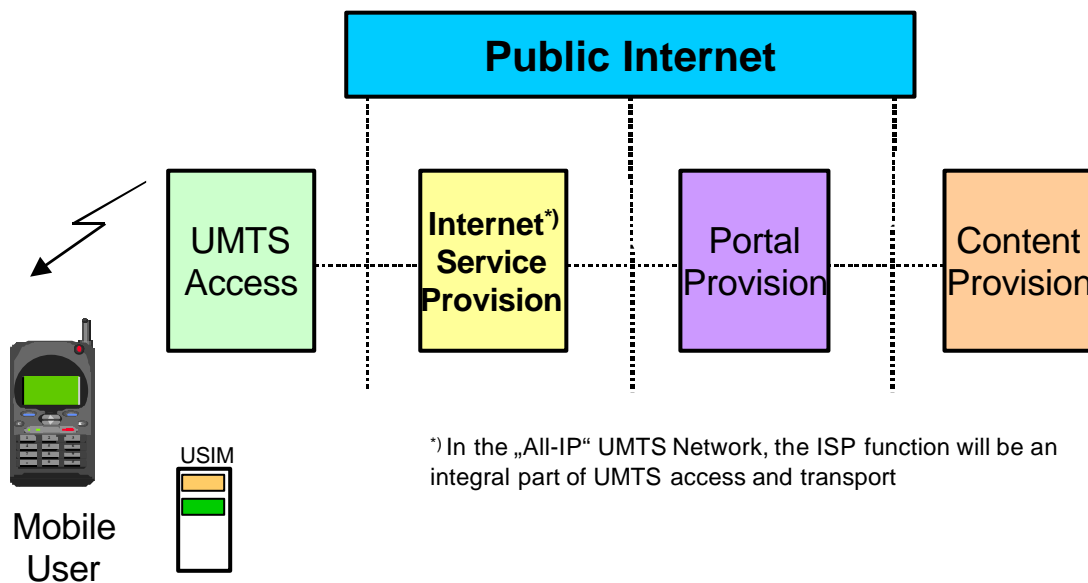


Figure 7.1: UMTS Access and Other Service Provisions Separated

7.2.2 Ownership Business Model

Figure 7.2 represents a scenario where one operator takes the role of Service, Portal and possibly also Content Provider. This means that there is complete control both in UMTS access and transport and on the IP side. The operator can decide autonomously which solutions for mobility, QoS and security control are the most suited to its business model, since all the nodes and networks involved are under its own control. In particular, the handling of mobility, QoS and security issues are eased by the fact that all the adopted solutions are known and designed to work together. The operator can also provide the user location information to applications and content offerings under its responsibility.

All the related subscription and security data on the USIM module belong to the same legal entity. It is quite important to note that a particular content could be money, when the corresponding Content Provider is a bank. This example highlights the scenario where the operator can also assume the role of a bank, and the money stored in the USIM can be used to purchase products or services. In this way the USIM becomes an electronic wallet. Optionally the user can, even in this case, have relationships with an independent Internet Service Provider, possibly for a different set of services not provided by the main operator. The data related to this Provider could also be stored on the same USIM.

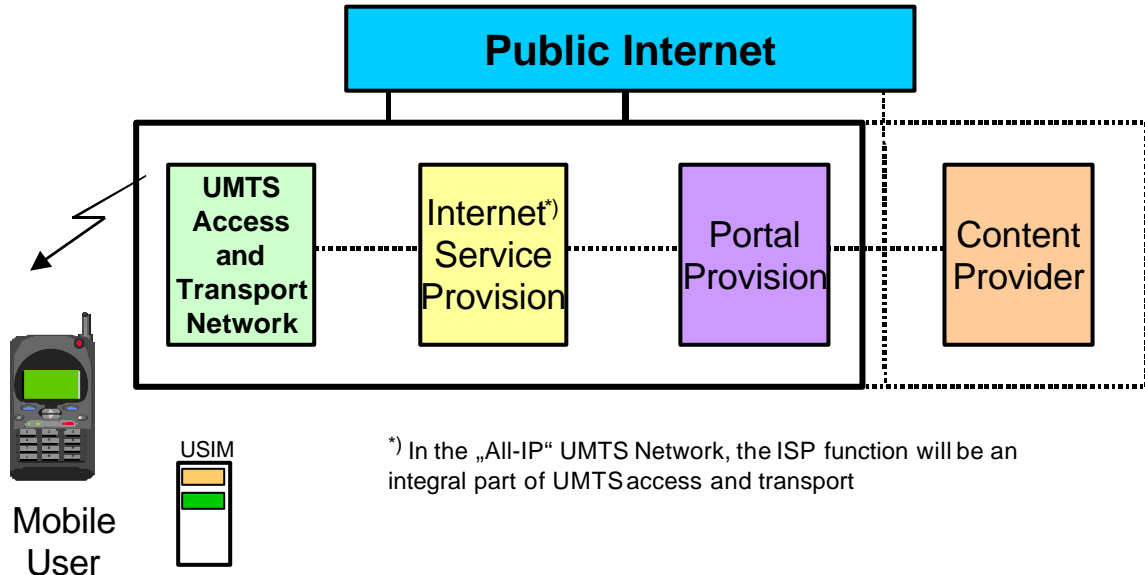


Figure 7.2: UMTS Wholly Owned ISP and Portal Operator

7.3 Key Success Factors

There are two major groups interested in portals: those who provide network access (Network Operators) and those who execute transactions. For both groups, the same factors – reach, richness and affiliation - are important when it comes to the selection of the portal. Network Operators can be very strong in at least two of these dimensions – reach and affiliation – and are therefore well positioned in the portal industry. The third dimension – richness – can be covered by alliances with content aggregators.

7.3.1 Reach and Richness

For the end-user, the value of the portal will increase as the amount of information the portal provides increases. Furthermore, the number of other users that can be reached is important as well.

With sufficient reach to other users and to service offerings, the richness and quality of the information offered is important. The more and the deeper the information on a certain item a site can deliver, the higher the potential value to the user will be. This is true not only from the end-user perspective but from the business perspective as well. For them, a high richness of information about the users translates directly into segmentation quality. Portals that attract well-targeted consumer groups are of much higher value to the business community than the very broad general purpose portals that exist today.

7.3.2 Affiliation

For the end-user, it is also important that the portal provider is affiliated to the user rather than the sites the portal gives access to. To rely on the information provided by the portal, the user must be convinced that the portal provider acts at least in a fully neutral way or, even better, in favour of the end-user. It is highly likely that portals that are credible in communicating their consumer focus will be much more successful than less well focused portals.

7.3.3 Positioning of Network Operators within the Portal Industry

The UMTS Network Operator may have a customer base of several million end-users. In addition, the operator should have a clear picture of the segmentation of the customer base. Therefore, the operator's portal is likely to be attractive to a large number of other companies as well, increasing the reach for the end-users. This positively self-reinforcing cycle will ultimately provide high value to both users and Content Providers.

The richness of information provided by the various portal sites cannot easily be influenced by the Network Operator. However, by offering a very valuable user base to the portal sites, the operator is attractive as an alliance partner to content aggregators that are able to provide rich content. Since the number of premium-class aggregators is limited, alliances between operators with a large customer base and aggregators with a high richness of information are likely to be business winners.

7.4 The Mobile Multimedia Portal Business with Content Provision

If a wholesale/retail strategy based on an intelligent IP-access platform is adopted, UMTS Network Operators can seize new opportunities in both market segments, as described in section 7.2. Such a strategy adds value, in the form of fast IP access and dynamic service selection, to the basic transport capabilities. The Network Operator would then need to come to an agreement with a Content Provider to deliver content to customers. Part of this agreement will be a way of identifying and managing the content, thus allowing it to be billed. This could be provided with the Mobile Multimedia Portal platform. The Mobile Multimedia Portal platform has two advantages:

- it would be available instantly to a wide range of Content Providers, and therefore the value to the customer would increase; and
- the billing and accounting of "content" traffic would be much easier.

As well as billing, issues of encryption, fraud, security and roaming are important to the Mobile Multimedia Portal business.

7.4.1 The Role of the Content Provider

The Content Provider has an increasingly important role, not only as a simple provider of content but also by adding value (through data mining, repackaging, etc.) or by offering complementary or competing services. In traditional media industries, Content Providers are owners of content (e.g. broadcasters, publishers or people that aggregate content created by 3rd Parties, such as music or film producers or authors). They have no mobile industry experience, no idea of user location, and no billing capabilities for combinations of different kinds of content or service.

No one is better placed than the Content Provider to provide content in different formats – except that it has to get such requests via the operator, in many cases *as a function of the network conditions*. On the other hand, more and more data will be provided as meta-data, the same content being delivered in a variety of formats. Then, only in a few cases will there be a need to transcode the information, and that can be done by either the Content Provider or the Network Operator.

7.4.2 Billing

The move away from telecommunications towards information delivered over IP infrastructure presents an entirely new set of challenges for the billing manager, the pricing manager and the business as a whole. The traditional elements that were billed in the world of telecommunications become irrelevant. 'Time' dependent billing on the network will disappear quickly as customers get used to the idea that connections are 'always on'. Distance will disappear quickly, too – IP addresses are always 'local'. The cost of transporting information and maintaining the network, however, must still be covered.

As described in section 7.2, there will be no one business model but a number of different models used. Each agreement between Network Operator, Internet Service Provider, Portal Operator and Content Provider could be different. The key to an efficient billing process will

be flexibility and scalability, as the volumes of billing data being filtered by mediation devices increase from today's levels by factors of five or ten.

The different elements that will be billed in UMTS networks include transport and content, and the different entities that will pay include corporate customers and consumers. This increasing complexity will need to be addressed, so that the customer sees both clarity and simplicity in the bill. Quality of Service is likely to feature in UMTS billing, with QoS discounts needing to be considered. Overall, information will be collected from a wide range of network elements, increasing the need for accuracy in inter-network transactions.

The fundamental billing issues being addressed are:

- Linking the detailed IP records (IPDR) from the transport and content layers, to ensure that correct accounting can take place.
- The continuing use of pre-paid accounts, which will demand real time metering, or real time mediation methodologies, and is complicated by the uncertainty of estimating how long a session will last. It will not be acceptable to 'cut off' a session during a piece of music or during a video.
- Roaming, which will require both the delivery of personalised services whilst on a Visited Network and localised services, such as directories. Pre-paid roaming requirements will need to be addressed. The GSM standards of TAP3 and CAMEL provide the accepted building blocks to address this issue.
- Quality of Service issues, which are being addressed by billers, mediation companies and network equipment manufacturers.
- Interconnect agreements, which will become more complex when content delivery and accounting is considered.
- Access to and usage of customer data. This needs careful attention, in light of national regulation.
- The impact of IP addresses.

The billing issues are described in detail in the UMTS Forum Report #11 "Enabling UMTS Services and Applications".

7.4.3 Encryption

3GPP intend to use an algorithm for confidentiality called Kasumi. The intention is that this will be published on the Internet for public scrutiny. Authentication will be similar to GSM, allowing a choice of algorithms. The network is authenticated to the mobile to minimise the false base station attack possible in other technologies.

The security architecture for 3GPP is known as AKA, and is also under consideration for adoption by TR45 in North America. This will allow roaming from the security architecture point of view between the different IMT-2000 technologies, as well as backward compatibility with GSM, ANSI-41 and ANSI-136.

7.4.4 Technical Fraud

Both the terminals and the network itself will be connected to the Internet. This means that they must be protected by firewalls or they would be accessible by other users connected to the Internet.

Terminals will be capable of running Internet browsers to access information, as well as making voice calls or recording pictures. This implies that the terminals will be capable of executing programs, in the same way as web browsers such as Internet Explorer or Netscape do at the moment. There is therefore the possibility of viruses or Trojan horses (rogue code) in the mobiles, although security and protection exist within the standards.

Location services are already a reality, and personal privacy issues for customers will continue to require addressing.

As well as the traditional identity of a telephone number, UMTS terminals will also be known by Internet addresses, which may be fixed or changed for every call. Although the network will know the connection between these, it will probably not be known to other users on the Internet. This will mean that there is likely to be more protection of the customer and anonymity, but conversely it will be harder to identify individuals because they will have multiple identities.

7.4.5 Network Reliability and Security

Many of the existing infrastructure elements in mobile networks, such as switches, Home Location Registers and Authentication Centres will be duplicated in the IMT-2000/UMTS networks. These will be connected to the Internet, which generally has network redundancy rather than duplicated network elements. This has to be taken into consideration in cases where UMTS Network Operators build their own IP infrastructure. Additionally, external interfaces to the public Internet will have to be protected by methods such as firewalls or the blocking of communications coming from unknown destinations. Attacks on networks can be expected to increase as networks are opened up to Internet hacker communities, because the hardware used will be based on well known Internet technology, rather than telecommunications networks and switches. Furthermore, sending control signalling over the Internet is likely to introduce additional security threats.

Conventional fraud detection systems, which allow fraud to be identified from switch records (which show information such as call date, time, destination, type) will no longer work. Such information, as well as the customer communication, may well be hidden from the operator by Virtual Private Networks or through IP tunnelling. Fraud detection will therefore need to be re-addressed.

7.4.6 Roaming Impacts

Roaming is a business issue. In the ideal UMTS world, users would be able to use local services wherever they are. Service value will be an issue as services need to be agreed in roaming contracts and additional services have to be added in the charging record format that is exchanged between operators. For example, new service types in TAP (Transfer Account Procedure) format, which will probably also be used in UMTS networks, will need to be defined. As described in the billing section, the continuing use of prepaid will also add additional functionality.

7.5 The Role of New Players

A number of new players, known as brokers or information integrators¹³, will emerge, and as the value chain evolves and gets more complicated many more are expected to materialise.

As the mobile portal profiling exercise might be too complicated for some users, and until user-friendly mechanisms are developed to trivialise the task, there is a requirement for profiling expertise in setting non-default profiles. In the case of corporate accounts, a special kind of broker will be able to pre-set a number of accounts with a basic configuration, still leaving some flexibility to the end-user. It should also be noted that profiling will certainly not be limited to the portal configuration. Information integrators will make sense (data analysis) of all the information collected (e.g. from data mining) and will prepare and provide syntheses at an agreed level of detail to the user. This will include data visualisation.

Other new players that will emerge are Application Developers, specialising in applications (e.g. Java-based) running in mobile portals; and Graphical User Interface specialists, able to “work around” specific terminal limitations, supplementing any transcoding undertaken by the Network Operator or Content Provider.

¹³ e. g. Bertelsmann Media Systems, Castle Transmission

8 CONCLUSIONS AND RECOMMENDATIONS

The Extended Vision of the UMTS Forum investigates the value chain from the end-user up to content provision. In addition to the traditional Telecoms Value Chain establishing mainly transparent connections between two end-users, the UMTS Operator expects guidance on how to proceed in the new field of information-based services.

This Report gives an overview on the first investigation results in the UMTS Forum. However, further more detailed work will be necessary taking into consideration the fast changes of concepts and businesses in the Internet driven world.

Mobile Operators are well positioned to exploit the many new opportunities afforded by the introduction and of 3G mobile multimedia services from 2001/2002. UMTS is much more than Internet or wireless.

The Extended Vision enlarges the view of UMTS to a scenario of a heterogeneous network environment with various organisations playing different roles in the same value chain. Several issues arise in both the mobility and security areas.

This Report by the UMTS Forum demonstrates how UMTS will continue to develop and add value, enabling players to grow their Mobile Multimedia businesses to 2010 and beyond. The value chain from the end-user up to content provision has been investigated. In addition to the traditional telecoms value chain that typically establishes transparent connections between two end-users, UMTS Operators, suppliers, Regulators and investors are given practical guidance on how to proceed towards new market opportunities for the provision of mobile multimedia services in the emerging Information Society of the 21st century. The Extended Vision of UMTS identifies the new opportunities for service providers and content providers to generate new value, not through traditional marketing approaches, but by intensifying segmentation to support personalisation, location, interactivity, the operational and transacting environment, and m-Commerce.

A single “killer” application will probably not appear, but it seems likely that some “killer cocktails” or new groups of services/applications will, being tailored to specific end-user profiles and needs. In general, basic service concepts are common between 2G and 3G. However, the service delivery mechanisms and user device attributes and interfaces will be vastly improved with 3G. Services that already exist will be greatly improved with images. Customer segmentation based on lifestyle management is crucial to produce and understand 3G services, and their marketing and implementation.

The provision of a Mobile Multimedia Portal platform, which could either be shared between UMTS Operators or maintained as an Operator-specific one, enables the UMTS Operator to enter the IP-based business with a variety of applications, from information and entertainment to mobile commerce.

Internet Domain Names, IP-addresses and E.164 addresses are a limited resource. Thus, timely advanced planning of such resource is of great importance for the industry. At this stage, it does not matter whether the Internet Domain Names and Numbers for the mobiles will finally be used either by an ISP, Portal Operator or the UMTS Operator itself. An early clarification of address reservation and structuring needs to be done.

More detailed work will be necessary to deliver the full UMTS vision, taking into consideration the fast changes of concepts and businesses in the Internet driven world.

The existing standardisation structure in telecommunications needs to be extended to the Internet. Industry-wide collaboration, with a tolerant regulatory environment, is preferred since individual initiatives fragment and would not prove sufficient by themselves to sustain long term growth and market success.

This Report contains a number of detailed recommendations from the UMTS Forum covering future research and standardisation requirements, and necessary regulatory actions in the critical areas in order to define, standardise and deliver openly-available efficient solutions; specifically:

Rec #	Recommendation	Reference Section
1	The UMTS Operator should take up the new business opportunities via partnering with ISP, Portal Content Providers or consider them in one ownership.	7.
2	Operators have the opportunity to move up the value chain: <ul style="list-style-type: none"> • In a stepwise approach towards "All IP" transport and switching, following 3GPP Rel. 99, Rel. 00 and further Releases towards HTML-DHTML-XML transparent solutions. • By accessing content via a Mobile Multimedia Portal Platform. 	5.
3	Harmonised timely introduction of " <i>service portability</i> " in conjunction with a Mobile Multimedia Portal platform will enable personalised content management. Functional blocks of the Mobile Multimedia Portal platform and its phased introduction should follow a harmonised milestone plan.	4.3.1 4.2.1 (3.1)
4	Early clarification of address reservation and structuring is vital to the success of UMTS/IMT-2000. Timely advanced planning of Internet Domain Names, IP-addresses and E.164 addresses is of importance for the industry in order to ensure an early clarification of address reservation and structuring.	4.6
5	Any regulation should be kept to the minimum necessary to achieve the desired effect. International solutions to regulatory problems should be sought. The regulatory framework should allow public service broadcasters and programme makers to take advantage of the new opportunities offered by the technological convergence in a commercial framework and in competition with other market players. However, such commercial activities must be kept strictly separated from state-subsidised activities.	6.3
6	Individuals should be allowed to carry IMT-2000/UMTS mobile terminals with them all around the world without any restrictions when crossing borders, such as customs duties or individual licences, and to use them, subject to normal connection requirements. Such mobile terminals shall of course comply with internationally accepted rules concerning interference, health and safety.	6.6.1

7	3GPP should take up investigations and define UMTS solutions for <ul style="list-style-type: none">• IPv4/v6 co-existence and integration with IPv6• QoS control, applications-dependent• IP-security combined with USIM• Mobility management/roaming for information services (IP-based).	5.1
8	All players should work to achieve global acceptance of the principle of Suppliers Declaration of Conformance to mutually agreed requirements. This will simplify the placing on the market of future multi-mode terminals.	6.6.3

9 REFERENCES

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ANNEX I

SERVICE DESCRIPTION

Mobile Banking

Overview

Mobile banking is a subset of mobile commerce. Mobile commerce is any transaction with a monetary value that is conducted via a mobile telecommunications network. Mobile banking together with mobile broking and mobile wallet/cash are part of mobile financial services.

Description

Mobile banking allows the customer to:

- View account balance(s)
- View statements
- View direct debits/standing orders
- Pay bills
- Transfer money between accounts
- Be notified of last credit/debit transactions
- Be notified of credits/debits above a chosen value
- Be notified when his balance goes above or below a chosen value
- Request the opening/closing of an account - savings, VISA, MasterCard
- View interest rates
- Check interest earned on accounts
- Set up direct debits

Why is it important?

Mobile banking already exists on 2G networks. There are more than 30 mobile banking services already operational world wide, and a few have reached mass-market status. Mobile banking services could generate additional revenues for both the banks and the network Operators, where banks share Operator revenues generated by the SMS enquiries.

On 3G networks, the cost per session will be lower than on 2G networks and the transmission capacity will be higher. This will allow users to obtain more information more quickly.

Customer benefits

- Anytime, anywhere convenience (24hr/365 day service) in managing banking from their mobile phone
- Time saving
- Information is always up-to-date
- Ease of access

Bank benefits

- Additional distribution channel
- Cut costs - lower operating costs, reduce staff and number of branches
- Increase customer loyalty

Operator benefits

- Increased airtime usage
- Increased customer retention
- Potential to attract new customers

User segmentation / profile

The target market for mobile banking is the consumer segment (private individuals).

The detailed segmentation is:

- 16-34 year old market
- People familiar with telephone banking
- People familiar with Internet banking
- People familiar with bank accounts or credit card accounts, who have or are willing to purchase a mobile phone
- Business professionals

Value proposition

50 % of the target market will use the mobile banking service.

Regional variation

Mobile banking service will be vastly accepted in Europe, North America and Japan. The likely acceptance of this service will be lower in Asia Pacific and much lower in other regions.

Usage

Duration

The duration of each session will be quite low, around 140-180 seconds with a data bulk of no more than 1 Kb.

Number of session

The number of session will be higher than telephone banking. As mobile banking on 3G networks will be easy to use; users will tend to access the service more often; around four times per week.

Other

Usage will depend on the service portability (virtual home environment - VHE). Users will expect to be able to access this service anytime, anywhere.

Drivers

- Customer requirement for anytime, anywhere banking
- Banks' requirement to reduce banking overheads
- Trend that mobile phone customers will outnumber fixed telephone lines
- Trend of strong growth of telephone and Internet banking

Inhibitors

- Bank customers who do not use phone or internet banking, but prefer to visit their high street branch
- Phone banking customers who enjoy the service and believe it is more convenient than Internet banking
- Retail price of mobile banking must be lower or no more expensive than phone banking
- Customers are unlikely to use mobile banking until their own bank offers the service
- Some financial institutions remain reluctant to upgrade their existing transaction infrastructure.
- The mobile Operator needs to provide access to all banks to offer the mobile banking service.
- Already exists on 2G networks, however mobile banking will be included in all 3G service packages

- Security concerns (real or perceived)

Source of revenues

- It is unlikely that the advertising potential will be high. This will depend on competition and whether or not banks have to offer all their services free of charge to the end-user.
- The banks are likely to charge their customers a monthly subscription charge to gain access to the service. Competitive pressures may force the banks to provide mobile banking for free.
- The mobile Operator will charge airtime charges to the customer to access the mobile banking service.
- Any request messages to the bank will be charged to the customer by the mobile Operator.

Market timescales

Mobile banking already exists and will become wide spread from 2001. 3G networks will offer a better, more user-friendly service. The maturity year will be about four years after the launch, around 2004-2005.

Mobile shopping**Overview**

Mobile shopping is part of mobile commerce. Mobile shopping groups together all services that allow you either to purchase and pay on-line goods/information with your mobile phone, or to use your mobile phone as a payment terminal at public access points like drinks machines or retailers.

Description

Mobile shopping will allow the customer to make:

- Online purchases from traditional shops for delivery and online purchases from virtual shops for data and/or information (Information, Ticketing, Music, Video, and Games) delivery. This service will also allow users to have a multimedia (Audio, Pictures, Video) description of the product they are going to purchase
- Immediate purchase at retailers or public access points using mobile phone as a payment terminal

Why is it important?

By 2003, the worldwide penetration for mobile will be more than 20 % and more than 840 million phones will have been produced. More phones will be connected to Internet than PCs. Mobile shopping will probably be a key service for 3G with higher bandwidth and multimedia capabilities. Advantages for all actors in the value-chain are important:

- For the end-user, ease of use
- For Operators, a way to increase the ARPU and reduce churn
- For banks, a new and faster channel to market with lower operational cost
- For Portals, content provider and retailers, a new personalised channel to market

User segmentation / profile

The targeted segment for mobile shopping is clearly the consumer segment.

Value proposition

50 % of the segment targeted will use the mobile shopping service.

Regional variation

Mobile shopping service will be largely accepted in Europe, North America and Japan. The likely acceptance of this service will be lower in Asia Pacific and much lower in other regions.

Usage**Duration**

The duration of each session will be quite low, around 1 to 4 minutes with a data bulk of some 10-Kb.

Number of session

End-users are expected to access these services around once a day.

Drivers

- Mass market mobile
- Mobile commerce
- New technologies for wireless like WAP, OS, GPRS, EDGE, 3G, Bluetooth, Biometry (i. e. finger print recognition)

Inhibitors

- Secure transaction techniques
- Standardisation (for encryption/decryption and digital signature)
- Trustworthy third party
- Shopping habits

Source of revenues

The mobile Operator will charge airtime charges to the customer to access the mobile shopping services.

Market timescales

Mobile shopping, as it has been described above, will take off about 2001. The maturity year will be about one year after the launch.

Location based entertainment**Overview**

Location based entertainment provides value for an end-user in certain locations. In this case value relates to excitement, pleasure, rewarding experience and more tangible things like information, speed and convenience. Location based entertainment is part of location based services.

Description

Location based entertainment allows the customer in certain locations to:

- Check programmes in theatres, cinemas etc.
- Make ticket reservations (theatres, cinemas etc.)
- Make travel reservations
- Play local games or join local game competitions
- Gamble on sports events e. g. guess team player who scores first goal
- Get local tourist information
- Get information about local restaurants, discos etc.

- Receive publicity on happenings in the area
- Get information on sports in the area
- Participate in local chat groups e. g. backpackers arriving at a new place

Why is it important?

Location based entertainment already exists in 2G networks in some places. One example of this type of service is the tourist guide in Rome, Italy. Users can receive the location dependent information of tourist attractions onto their mobile phone. 3G networks will offer more opportunities for location based entertainment due to higher data speeds and more advanced mobile terminals. Content will be richer and there will be access to the Internet in 3G. Today terminals are primarily designed for voice services.

Customer benefits

- Easy access to services in the area
- Time saving
- Up-to-date information
- Entertainment
- Profiling i. e. user specifies his/her own preferences for the location based services

Service provider benefits (can be also Operator in this role)

- Additional distribution channels (e. g. tickets)
- Advertising potential
- Attract new potential customers
- Possibility to offer services to different target groups

Operator benefits

- Supports new business models
- Increased airtime usage
- Possibility to use zone tariffing
- Possibility to offer services to different target groups
- Potential to attract new customers

User segmentation / profile

The target market for location based entertainment is the consumer segment (private individuals). The detailed segmentation is:

- 10-60 year old people
- People familiar with Internet services
- People familiar with mobile services

Value proposition

50 % of the target market will use the location based entertainment.

Regional variation

Location based entertainment service will be vastly accepted in Europe, North America, Japan and APAC.

UsageDuration

The duration of each session will be around 2 minutes with a data volume specific to service.

Number of sessions

Location based entertainment service is easy to use and consumer segment will use it on average five times a week. Some users might use the service several times per day.

Other

Usage will depend on the location. Users will be more active in the places with larger variety of different location based entertainment services. Tourist attractions related location based entertainment services will be used frequently.

Drivers

- Trend of strong growth of telephone and Internet services
- Growth of mobile phone penetration
- Customer requirement for easier and faster services
- Customer requirement for services 'here and now'
- Customer requirement for more value (excitement, pleasure, rewarding experience and more tangible value like information, speed and convenience)

Inhibitors

- People are not willing to spend more money for this service than for traditional services (location based entertainment has to be cost-effective)
- Service is not easy to use
- Service is not trusted

Source of revenues

- Advertising is important source of revenue in location based entertainment
- Monthly fees to get location based entertainment
- Airtime used
- Content based charging

Market timescales

Market timescales for location based entertainment will be today (WAP services). Location based entertainment will evolve with standards, technology and handset availability. Functionality and availability of this service affect maturity year.

Remote monitoring

Overview

Remote monitoring allow users to manage different information at distance.

Description

A digital camera transfers its images to a server via a dial up or LAN based connection. This can be done continuously to produce a video, or an image can be captured at timed intervals, or event triggered. Any authorized person can then view the captured image with a mobile terminal via web browsing. This "WebCam" can be fixed or part of a mobile terminal.

The range of sites to monitor is as rich as life itself. From the daily life perspective we can receive images of our children while at school or daycares or we can monitor our house or car for protection and avoid traffic jams or long queues in our local stores. From a work perspective we can monitor construction sites and where people are waiting for our taxi service as well as queues in the canteen and delays of flights and deliveries. From a business perspective companies can provide their own live reporting of the wonderful ski resort they offer, the slopes, the view, the restaurants and the nightclub.

If the digital camera is part of a mobile device the usefulness expands to areas such as electronic postcards and "experts on call", but those are service groups valid on their own.

Why is it important?

Bridging physical distance. With 2G we can listen in and make ourselves heard almost whenever and wherever we are. But we are limited to voice, thus we are still blind. Remote monitoring will make us see and be seen whenever and wherever we are. The evolution from radio broadcasting to television can give an idea of what we could be expecting.

User segmentation / profile

With the broad range of applications, remote monitoring will have a large value to every customer segment.

Usage

The average session will be shorter than a telephone call. The fact of having seen what the restaurant looks like, the traffic situation or a few minutes from the daycare, will give all the necessary information. Consequently the average session will be about 60 seconds.

Most people would have at least a couple of situations every day where an image would give superior information to voice or text, starting with the traffic situation and today's lunch menu.

Drivers

The need to see, not only hear.

Inhibitors

The technology has existed as long as Internet and LAN but as yet a limited acceptance. Every form of surveillance without direct permission is violating the personal integrity. Even with permission, like a video telephone call, users can feel uncomfortable.

Legal issues are important.

Source of revenues

The revenues for the remote monitoring could come from the subscriber or the company having put up the WebCam. The subscriber might have to pay to see the latest traffic situation or a scenic view while the local bar or ski resort probably would take it on their marketing budget to show live images from their establishment.

It is likely that some companies will make remote monitoring their business concept. They put up the WebCams and make money on advertisements sold in connection to the broadcast. A site with WebCams of famous cities like New York could probably be used to sell advertisements of hotels, restaurants and events in the city.

Market timescales

WebCams already exist. Given the low cost of the camera every tourist attraction and public location could easily be covered. The technology to transfer images in a compressed format is also well advanced. With the 3G terminals everybody will have the "TV monitor" in their pocket.

Integrity will be a major inhibitor. It is against the law in many countries to put up surveillance cameras without permission. This limits the spread to situations where the viewers and those being monitored have some kind of agreement, like in the nursery.

Gambling

Overview

Gambling can be classified as an entertainment service. It allows customers to take part in different kinds of games, staking or risking of something of value upon the outcome of a contest of others, a sporting event, or a game of chance, upon an agreement or understanding that the person or another person will receive something of value based on that outcome. The entity which receives bets or wagers can be considered as the Service Provider. There are different kinds of such SP: traditional (Casinos e. g.) and ISP who offer an interactive computer gambling services through Internet access.

Gambling through an on-line interaction with a SP and mobile phone access is Mobile Gambling.

Description

Mobile gambling should allow the customer to:

- Choose between different games
- Consult the news about past performances (if necessary) and the description of the game (to be able to play correctly)
- Chose the possible alternatives for betting
- Be notified of the choice selected
- Bet on the alternatives he thinks best
- Be notified of the bet placed
- Follow the on-going situation (real-time)
- Be informed of the on-going situation (periodic updates)
- Consult the results
- Transfer money between accounts

Why is it important?

Mobile gambling already exists on fixed networks (Internet). The aim is to understand the real value for the customer to use this service in mobility. The value could be the possibility for the customer to bet without having a fixed computer wherever and whenever he wants.

This service can also be delivered on 2G networks (WAP).

3G network capacity will allow users to obtain more information more quickly and to have a service with a better performance in terms of type of information available (not only text but also images).

Customer benefits

- Anytime
- Anywhere from their mobile phone
- Information is always up-to-date
- Ease of access

Service Provider benefits

- Additional distribution channel and the possibility to increase the diffusion and the average use of services because of the easy access
- Cut costs - lower operating costs, reduce staff and number of branches
- Increase customer base and customer loyalty

Operator benefits

- Increased airtime usage
- Increased customer retention
- Potential to attract new customers
- Differentiation of the revenues (to share with the SP)

User segmentation / profile

The target market for mobile gambling could be the consumer segment (private individuals).

The detailed segmentation is:

- 25 - 50 year old market
- People familiar with Internet gambling
- People familiar with credit card accounts, who have or are willing to purchase a mobile phone
- 10 % of the target market will use the mobile gambling service.

Regional variation

Mobile gambling is likely to be accepted in Europe, North America (where Internet gambling is already popular). The likely acceptance of this service will be lower in Asia Pacific, Japan and much lower in other regions.

Usage**Duration**

The duration of each session depends on the kind of game and on the level of service performance. It could be from 5 minutes to 10 minutes.

Number of session

As mobile banking on 3G networks will be easy to use; users will tend to access the service more often than currently on Internet; around once per week.

Drivers

- Customer requirement for anytime, anywhere gambling
- Service Providers' requirement to increase their customer base and loyalty
- Operators requirement to offer a large number of services to their customers to increase their customer loyalty and to share revenues
- Trend that mobile phone customers will outnumber fixed telephone lines

Inhibitors

- Players who prefer to go to the casinos
- Retail price of mobile gambling must be no more expensive than Internet gambling
- Security concerns (real or perceived)
- Legal aspects (illegal in some countries)
- Privacy aspects

Source of revenues (for the Operators)

- Advertising potential will be high
- A % on revenues of SP (coming from each bet)
- Charge airtime charges to the customer for access to the services

Market timescales

Mobile gambling could be delivered by 2G networks now and it will become widespread from 2001. 3G networks will offer a better, more user-friendly service. The maturity year will be about four years after the launch, around 2004 - 2005.

Interactive Game

Overview

Interactive games are an example of the type of mobile infotainment available on modern mobile handset. They allow the player to download new games or levels, compete against other remote users and upload their highest scores, etc.

Although games do exist today, 3G will enhance and develop their interactivity and multi-media content. The key changes to games that will be seen as new technology is implemented are:

- Improvements to user interface (i. e. use of audio and video)
- Interaction with other players (group gaming)
- Ability to download new games and game upgrades over-the-air or via kiosks
- Security improvements will allow gambling, lottery and competition type gaming to use the wireless platform.

Why is it important?

Customer benefits

- Opportunity to use leisure time for fun
- Simple access in any environment to familiar games from other media
- Creation of virtual gaming communities
- Win prizes
- Escape from the real world

Game Developer benefits

- Act as a channel to subscribers
- Increase market share (appeal to new customers) and customer penetration
- Increase revenue

Operator benefits

- Customer loyalty and affinity
- Greater use of network; new revenue streams
- Make the phones more fun

User segmentation / profile

The games will be targeted primarily at the 6-35 year old market. Gamers are becoming older and the women's market has already grown by over 30 %. If some games are downloaded onto new mobiles as standard, the market growth will mirror the general upward trend in terminal sales.

Usage

Duration

5-40 minutes per game, perhaps longer, depending on the level of interactivity

Number of session

This depends on the nature of the game and on how hooked players become!

Drivers

- Growing market
- The ability to increase the standard of graphics/interactivity to be able to rival that of desk based PC games.

Inhibitors

- Download speed on a handheld device
- Battery power/consumption
- Noise/neighbour annoyance in public places
- Operator connection charges
- The reliability of the connection
- The concept and prototypes already exist but require improvement

Source of revenues

- The initial game download
- % of data download/airtime revenue (perhaps encouraged by prizes etc.)
- The download of additional games
- Links to game-based/theme-based fashion/retail websites

Experts on Call**Overview**

Experts on call is an information advisory and consultancy service where consumers and business people can seek and obtain specific expert advice at anytime via their mobile Internet device.

Description

An interesting consumer or business application is the ability to have experts of all types at your disposal instantly – possibly for the price of a telephone call (or less).

Experts on call gives individual users access to instructions and information via voice and menu driven information sources or live interactive exchanges with people who have expertise, and specific info they can provide to the mobile user.

A few examples of “Experts on Call” are

- Technical advice such as help making adjustments to a classic car engine
- Assistance resolving everyday do-it-yourself projects or household appliance dilemmas
- First aid advice regarding a minor injury
- The basics of how to change a tyre on an automobile

On some occasions the advice may even come from a close friend or a family member, because an agreement before a final buying decision saves time and money whether it is a house, a piece of furniture or a gift for a friend.

Digital cameras are becoming small, affordable and readily available, and many people now indicate that the next camera they buy will probably be digital. Since a camera is inherently a mobile device, mobile phone/camera combinations, and integration devices are likely to emerge over the next years. As on UMTS a reasonable quality full colour image can reach its destination in under a second, the consumer and business applications for services are endless.

The phone/camera device virtually gives the expert the “eyesight” he needs to advise you, help fix a problem, or make sure the right person arrives with the right tools and parts if a repairman visit is necessary.

In the early days, however financial justification for carrying image capturing mobile devices may lie with businesses who can justify cost more readily where a situation can be “rescued” due to the instant availability of an expert to assist with a problem.

In some cases the financial or customer service costs saved by this service will greatly exceed the initial and usage costs.

Why is it important?

In the same way that cellular phones were often bought for safety and security reasons with little intent to use the phone as a first choice voice telephone, likewise the experts on call facility will move people into mobile multimedia.

Although initially these services will be of high value, but infrequently used. This type of service may become the norm for more routine customer service advice on buying, using, or fixing products.

In addition to benefits to end-users, this capability creates cost saving possibilities for existing customer services, as well as creating new earning opportunities for individual experts of all types, perhaps fronted by an agency or listing service, as we can find today on the web.

User Segmentation / profile

The service is generally segmented into Consumer and Business users, with most people being interested in this service for potential assistance in various areas of their day-to-day life. To take this service beyond voice advice into the delivery of instructions, diagrams, animations and video clips the device being carried is crucial. It is not expected that this service alone will drive consumers to purchase these devices, but rather will become a valued service when other services cause a user to purchase a large screen web browsing device, or digital camera. Some business applications however, will justify specialised devices from the outset.

Value proposition

If equipped, 50 % to 80 % of people will use this service, but initially it will be used infrequently.

Regional variation

Restricted to content and types of expertise needed. Most markets will value this service.

Usage

Peak data rates may be high for some types of services, but will be very bursty in nature.

Duration

Duration of session could be average to long especially with interactive on line sessions.

Number of sessions

Average number of sessions will be low initially.

Drivers/Enablers

- Low cost media capable devices (7 million phones in Japan today are image capable i-mode and j-mode)
- Extension of Customer services offering to include experts on call
- Individual experts and bureaus and agencies to provide directory and assignment
- Real time multimedia capability
- Can be rolled out on 2/2.5 G networks

Inhibitors

- Cost of service
- Ability to bill 3rd party instead of user where service is included in a service agreement
- Users don't become familiar because it's not frequently used
- Coverage must be ubiquitous

Source of Revenue

- End-user pays standard or premium usage rates
- Advertising
- Flat rate or as part of bigger service (e. g. Automobile Association)
- Reduced cost of customer services (paid for by third party)
- Experts share revenue with Operators

Mobile office extension**Overview**

By provisioning more bandwidth and enabling data mobility between the corporate user and the central enterprise information centre, UMTS will enable a range of mobile services which until now were only available to users through fixed desktop clients. Such services will typically include E-mail, Intranet, synchronisation and directory access.

Description

Let us take the example of John, a salesman in a high technology company.

It's 8.30 am and John is stuck in a traffic jam on his way to the office. John logs on via his handset to his company corporate server and accesses his agenda, which his assistant has updated the night before. An important meeting starts at 9 am. John knows he is not going to be on time and scrolls through the company directory to call Alan, the chairman of that meeting.

At 9.15 am, John is in the meeting room. One hour later, a screenpop on his handset comes up with an E-mail from his secretary telling him that Mr. Smith, one of his most important customers, called. John leaves the room and calls his customer. It appears that Mr. Smith has not received the delivery that he was due to receive today and which might delay overall production. John puts his customer on hold and interrogates the corporate materials requirements planning [MRP - part of an ERP enterprise resources planning" (ERP)] via his handset browser interface. It turns out that the delivery is planned for the afternoon. John releases the call, informs his customer, and is able to return to his meeting five minutes later.

Why is it important?

In the example above, John was able to communicate in real time using all the information data stored on the enterprise servers. In the first session, he was able to minimise the impact of his late arrival on his colleagues, improving his and the company overall productivity. In the second session, he was able to improve the customer's satisfaction by providing immediately an adequate answer to his customer's requirement.

In an era when a great deal of corporate information is available and where many applications have been developed to extract and use it, being able to access this information anytime, anywhere will minimise time loss and improve the employee's productivity, synchronise all the company's resources and enhance customer care.

User segmentation / profile

These new services will be characterised by their ubiquity, speed, and convenience of access. Today, a mobile worker away from his office wanting to access such services needs to find a PSTN access point (e. g. in a hotel room - and access is often not possible through a digital PBX). This involves a slow modem connection at 56 Kb/s and may require some additional PC software configuration. Soon setting up a connection from a UMTS handset should be at the reach of those who are even not computer literate.

Such services should be made available to corporate users such as sales, marketing staff and managers. Some vertical markets use specific information data which would also be handy if accessible remotely. For instance, doctors would find it convenient to have access to their patient files while on a visit. It is anticipated that these services would be made available on a worldwide basis.

Usage

Like today in the fixed desktop environment, it is anticipated that the mobile office extension will be used several times a day by employees outside of their office whether on the corporate campus or on the road. Short and numerous sessions should result from frequently interrogating the corporate servers.

Drivers

There are various drivers for such services:

- Today's way of life where employees have less time and more things to do, requiring on the spot access and delivery of information
- Penetration of mobile handsets in the corporate environment, bought initially for voice and increasingly enabled for data
- Applications enabled for mobile data as shown by the initial success of data services in Japan and the recent enthusiasm for WAP services
- Need to differentiate on service by companies in highly competitive markets. Such examples can be found in the overnight carrier delivery service, where real time tracking and access of information have become key differentiating factors

Inhibitors

There are a few inhibitors for these services:

- Mobile handset user interface where corporate information has been designed to be accessed via large screens and not small handset or PDA screens
- Amount of data (bytes) required by the applications themselves initially designed to be running on the corporate LAN where bandwidth can rise to 10 or 100 Mb/s per station

Source of revenues

These services will generate several sources of revenues:

- Data revenues for Operators due to overall packet data exchanged between the employee handset and the corporate server
- Licence revenues for software developers in WAP related technology and products
- Service revenues for Operators, integrators and software developers to enable the wireless corporate LAN

Market timescales

These services will start to be deployed with WAP enabled second generation mobile systems in 2000. It is anticipated that as UMTS is rolled out, there will be an immediate requirement to improve the bandwidth to get faster and more convenient access to information.

ANNEX II

Detailed Requirements for Portal Set-Up

Requirements for Portal Set-Up

A role of a Portal with regard to the presentation of information can be perceived in two perspectives, from the end-users and from the primary attributes of a Portal owner. However, as the notion of what is the core business of a company evolves in time, Portals, especially if successful, might be spun-off.

The End-user's Perspective

The end-user of a device using such a Portal to obtain access to the information and value added services available will have some of the following expectations:

- Device & preference specific presentation of information

A user expects information to be presented in a format appropriate to the device being used.

Since one major goal of a Portal is to induce the user to use the Portal as the focal point for access to information and a user may use more than one device to access the Portal, the Portal (application server) needs to be able to determine the device being used. While a simple list of terminals commonly used could be presented, this is not advocated. A better implementation would use an automatic means of identifying the device and prepare (i. e. transcode) the information in a way that best suits the device characteristics. Techniques to discover the device's capabilities are being specified by the World Wide Web Consortium (W3C) as CC/PP¹⁴ and the Wireless Application Protocol (WAP) Forum as User Agent Profiles.

A device will in many, if not most of the currently envisaged cases, use a web browser as the means to present information to the user. However this may not be the only application model and the use of Java and other techniques that provide for device-independent authoring is envisaged, with the device determining the exact means of presentation. The WAP Forum's device-agnostic authoring model using WML is one simple example.

The use of speech as an alternative and means of delivery of information may also be envisioned. The accessibility initiative of the W3C and ongoing developments in the area of Design for All, are good examples of the approach required to meet the presentation needs of handicapped users or simply of those who prefer or need something other than the presentation of textural and graphical information on a screen.

The user may also be interested in the Portal providing access to a unified messaging centre, thereby allowing access to SMS, E-mail, faxes, voicemail etc., through a single

¹⁴ Composite Capability/Preference Profile is a collection of the capabilities and preferences associated with the user and the agents used by the user to access the World Wide Web.

preferred user interface. And finally, the user may be interested in subscribing to particular user groups/communities and have access to all relevant information.

- Personalised service

The user will expect a personalised service.

Users will expect to be able to select their preferred banking, stock trading, multimedia video and audio services, m-commerce sites to supplement a set of basic services associated with the subscription profile.

Such subscription profiles may well contain a basic set consisting of information, news, weather, E-mail, access to voice and unified messaging services. This basic profile may well be supplemented by additional choices reflecting additional subscription or corporate services. Finally there are the 'pick-from' services, where banking and e-trading are good examples. A user cannot be expected to use the bank or e-trading company the Operator of the Portal prefers. Thus the Portal owner allows the user to select their preferred services from a list or even to add their own entries.

Finally the amount of personalisation may depend on the user subscription. Free Portal services or those linked via the Portal may well be encumbered with banners and adverts as part of the business model. Such overhead penalises the user in terms of performance and potentially additional costs if flat rate billing is not being provided. Should the user be paying a subscription for the service, it is a reasonable expectation that access is completely personalised even to the extent of having banners and adverts removed should this be desired.

- Best quality possible for device, unless overridden by preferences/choice

The user will expect the Portal to be capable of delivering services that allow the capabilities of the device to be exploited to the fullest, e. g. highest definition of graphics, rich text, high performance audio. However, the user will also expect to be able to set preferences backing off from this best quality case (e. g. lower definition graphics or simple text, reduced quality audio), in the first instance and to selectively choose a higher level of presentation quality when required. This is particularly true when using wireless communications, where quality usually translates in terms of both delay and cost. Depending on the specific system being used and upon the network load, the user profile should specify the maximum allowed data rate (for bandwidth on demand systems), allowing this default setting to be overridden by the user.

Quality of service (QoS) is a much used concept but open to interpretation. QoS is particularly relevant in the case of a wireless Portal, where the channel/network performance will impact the user perception of the service provided.

A user may well have a QoS expectation from the Portal. This goes well beyond simple availability of the service and may include aspects of performance and how the service gently degrades as link performance and system loading affect the underlying wireless network performance. Quality of service can also be considered a cost issue to the user. A Portal and the associated wireless link management should be able to offer the user selectable levels of delivered quality and performance based on link bandwidth (i. e. cost),

system loading (which vary with the time of day), etc., *and thus should be able to measure those.*

Roaming can also present additional problems. Depending on the topology and cost structures of accessing the home Portal service when visiting another wireless network the user may require a change of settings to manage costs and performance. Some current implementations will not allow access to the full Portal functionalities from the Internet and sometimes rely upon agreements with other networks to allow access to the home network via secure links from local numbers. The user however, would expect access to all information regardless of where he is.

- Privacy & trust

The user has an expectation that the Portal respects their privacy. Unless explicitly authorised the user will expect information collected by the Portal not to be shared with service providers or any other organisations who would like to use such information for e. g. targeted advertising etc.

The user has also an expectation of trust in the Portal. Without trust the user is unlikely to make this the focal point of their access to information and services. The Portal needs to meet this expectation of trust by providing reliable information, a secure and trusted environment for m-commerce, reliable billing, respecting privacy etc.

- Single bill including m-commerce

The user already has a commercial relationship with an Operator or service provider. Using a Portal service is likely to imply additional service charges. The user is likely to demand a consolidated billing from the Portal owner for all services provided via the Portal. The exception might be higher value purchases where direct billing to the user may be the only appropriate means of payment.

Large bills are always problematic. From the users perspective large bills often result in mistrust or scepticism and from the Operator/service providers perspective often result in angry queries and higher customer service costs.

From other services, e. g. television, the user builds a perception of acceptable costs. A service may be free when encumbered with advertisements, while such adverts would be unwelcomed if a service is paid for via subscription. The user will certainly expect a clear indication of incurred costs of access and service usage from the Portal and to select how much advertising is tolerable, and from which sources, in lieu of access charges.

- Expectation of support & associated costs

While Portals on the Internet have relatively low levels of support, often available only via E-mail, this is tolerated because the costs of using such Portals is very low, and in many cases zero as ISPs are subject to ever increasing competition. Where a user is mobile and has few alternative means of requesting support they can expect a higher level of immediacy and contact with the customer service of the Portal owner. The cost of this support may be included in the subscription or separate depending on the type of subscription or problem.

- Potential to add device applications & maintain them (firmware etc.)

For devices with sufficient capability, the Portal service provider or application developer might wish to offer additional client software to supplement the basic browser etc. used to present information. The Portal should be capable of meeting the users' expectation should such devices become available. Further maintenance of such applications, and potentially even of the device's firmware, can reasonably be expected to be maintained via access to the Portal in the same way web access is used to provide and maintain applications on the Personal Computer (PC) and Personal Digital Assistant (PDA) devices in use today.

The Portal Owner's Perspective

- Branding

The Portal owner (e. g. an Operator) will want to build the relationship with the users. A major step is to create a strong brand awareness for the service. Factors such as banners, logos and presentation style are the classic ways to build this awareness of the service's brand but more important in the context of a Portal is the provision of appropriate information in an intuitive and well-organised way.

- Building & delivering personalised perspective

Arguably the Portal needs to support a variety of profiles for an evolution of basic subscription service bundles and to cater for various VPN and corporate Intranet extensions. Further, the Portal needs to allow personalisation to meet the needs of users, e. g. choice of banking service, stock broker, m-commerce etc.

The Portal also needs to define typical templates to help users to define the look and feel of their personalised Portal within the constraints imposed by the Portal owner. These templates will obviously allow for the inclusion of services but also of additional information. For example, a user who is worried about the cost of might be able to add the current bill or session cost indication on the screen in the same way a word processor can add the page numbers and keep them up to date.

Finally a well designed Portal will support both PULL and PUSH models of operation for information services. For example, telematics and or stock price changes can be profiled to inform the user when traffic is bad en route during a planned journey or when the price of a stock in the users portfolio moves +/- x% to allow appropriate action to be taken. A PULL model might be very well suited to e. g. White/Yellow pages directory lookup.

- Formatting to meet user & device requirements

The Portal must meet the need to provide content suitable for the device and which meets the user's preferences.

While the technology exists to adapt automatically the content to suit every device the Portal owner may wish to group different devices or device attribute capabilities to reduce the number of permutations. In so doing, a device needs to be related to the best-fit group when the profile for that device (UAPROF)¹⁵ or set of attributes (CC/PP)¹⁶ is disclosed during session establishment.

- Trust

In a service such as a Portal where the user is being offered a personal service an enduring relationship with the user will only be achieved if the user trusts the Portal. Trust is a complex feeling but two important aspects are security and privacy.

- Security

Several aspects of security affect trust. Just some are included here:

The security of any information being exchanged between user and Portal is important, and techniques such as encryption of the transport link can be used to achieve this.

Ensuring an accurate consolidated bill of services and m-commerce transactions is critical, and ensuring adequate authentication and non-repudiation are key techniques to achieve this.

Finally, it is important to ensure that the appropriate security mechanisms are applied to various types of service offerings, e. g. pay-per-view, subscription and free content business cases. A user may be more concerned over the data received and the accuracy of billing for a pay-per-view, or transactional service offering and might be particularly offended if unsolicited adverts are received during such a premium service.

- Privacy

A user needs to feel that the Portal respects their rights to privacy. Where communities of users are facilitated, for e. g. chat or even sharing personal interests, it is important to ensure the user can control the subscription to such communities with confidence that having left a community no residual presence remains.

Whether as part of a community or as an individual, protecting a user's access to Portal services, the user's identities and other personal information (e. g. PIM, address, credit card information) is a key requirement. Only such information as has been explicitly authorised by a user should be divulged to other users or groups.

¹⁵ In WAP 1.2 enabled devices, CC/PP (called UAPROF) is used however, it is optional, not mandatory.

¹⁶ Composite Capability/Preference Profile

- Meeting legal requirements

Legal requirements are placed on ISPs and other service providers, especially those holding personal information about users. A Portal owner must ensure such a service meets all these requirements.

This might well entail having to log a user's use of the Portal beyond the level required for billing and associated customer support. Issues of legal interception fall into this category.

- User behaviour monitoring (heuristics)

While a user may be able to personalise a Portal to meet its individual requirements and preferences, the use of heuristic technology can help. The gathering of usage logs and application of data mining technology can enable heuristic behaviour capture, providing the user with updated services and suggestions, based on recent past usage, for new services to be added to the personal profile. Eliminating old, even those seldom used services should be left to the user.

Where look ahead technology is being used to increase apparent performance of slower bearers, such heuristics can be used to modify the content for a user to include most likely next locations and to pre-cache, awaiting the most likely next request.

- Interface to provisioning

The use of a Portal results often in changes to the personalised list of services the user intends to call upon in the future. This needs to be reflected in the provisioned personalised service and so a close linkage between the provisioning system and the Portal needs to be considered.

The user chooses which categories of the bundled or aggregated services he wants to have in this created profile list. Each user will have a unique set of choices. The "Portal" will have to monitor and dynamically update the user's choice. In addition the appropriate tools will have to be made available.

- Ensure that the user can select preferred styles (colours, text size, synthesized speech characteristics, etc.) from choices offered by the user agent. The user must be able to override author-specified styles and user agent defaults.
- Ensure that the user may turn off rendering or stop behavior specified by the author that may reduce accessibility by obscuring content or disorienting the user.
- Ensure that users have access to all content, notably author-supplied equivalent alternatives for content such as text equivalents and auditory descriptions.
- Ensure that the user can interact with the user agent (and the content it renders) through all of the input and output APIs used by the user agent.

Since people use a variety of devices for input and output, user agent developers must ensure redundancy in the user interface. Messages and alerts to the user must not rely

on auditory or graphical cues alone; text, beeps, flashes, and other techniques used together will make these alerts accessible. Text messages are generally accessible since they may be used by people with graphical displays, speech synthesizers, or Braille¹⁷ displays.

- Provide information to the user about content structure and metadata to help the user understand browsing context.
- Alert users, in an output device independent fashion, of changes to content or viewports. But also to recognise the best features and the most used ones.
- Management tools i. e. to measure performance and tools to bundle/aggregate services and repair Web content. As well as Toolbox for new tickers, applets and new windows to create profile and content.

¹⁷ a special character display for the blind