9 Conclusions

This Annex has identified the following technology requirements for IMS. Not all are strictly "technology enablers", but all require significant technical resources and investment:

- IP-based core network incorporating six new platforms and with backbone packet transmission meeting VoIP QoS requirements.
- VoIP-capable inter-PLMN Internets.
- Concerted roll-out of networks, including IMS, fixed and private VoIP networks.
- Concerted introduction of SIP call control in terminals and networks, with SIP extensions for mobility and security.
- Innovative services which take advantage of IMS, especially interaction and integration of services including presence, person-to-person, person-to-machine, real-time and non-real-time features.
- Toolkits for service creation by third party entrepreneurs incorporating tools for mobility, security, privacy, authentication, registration, billing, service management and integration.
- Telecom Management for IMS platforms and SIP call control, including terminal management capabilities and charging.
- Highly featured terminals including compact browsers, voice browsers, voice recognition, multi-window video displays, innovative audio, pointing devices, memory, storage and downloadable client software.
- The IMS SIM (ISIM).
- The Wideband AMR speech codec is mandatory.
- Significant network tuning and optimisation including special test equipment.

In addition, the mobile industry needs to decide upon a deployment policy, either collectively or as individual operators, for some specific technology enablers. These include:

- IP transport in the RAN (backhaul links).
- "IP-based RAN" (efficient IP over the air including techniques such as Robust Header Compression and Signalling Compression).
- RAN capacity-enhancing techniques such as High Speed Downlink Packet Access.
- SIP Proxies in the core network.

The analysis of the essential technology enablers in this study has revealed the following issues that need to be addressed. Some relate directly to the technology. Others are commercial issues that are opened up by the very different nature of the technology and what it has the potential to provide:

- Should IMS core networks be deployed before the other enablers necessary to provide IMS services are available? Should they be deployed instead of circuit switched networks for basic voice services?
- Will Internet links between PLMNs be available which are capable of supporting VoIP and other real-time IMS services?
- Will the transmission in the GPRS core need to be upgraded to support IMS QoS requirements?
- Should the industry revert to a more concerted approach to network roll-out so that person-to-person IMS sessions can be provided for subscribers who are in different PLMNs or fixed networks and private networks?

- Will IPv6 be available and deployed in time to enable the wide use of Internet telephony as well as the many other 3G applications?
- Should the mobile industry allow external service providers to connect their own multimedia call control and applications platforms to the network so that they can provide their own innovative telephony services similar to the Internet model for information and entertainment services?
- To what degree should the introduction of SIP services and their roll-out be co-ordinated by the industry to ensure a common look and feel by person-to-person users and to maximise growth potential?
- Will service development toolkits that incorporate the necessary additional features for mobility be available in time to allow the development of attractive and innovative IMS services?
- Which legacy supplementary services should be replicated by IMS networks?
- Should the deployment of SIP proxies in the networks be considered in order to gain a short-term advantage but at the expense of potential longer-term disadvantages?
- Is the loss of spectrum efficiency resulting from the need for IP transport over the air acceptable to operators? Will it be possible to upgrade existing 3G RANs to incorporate such technology (e.g. ROHC, HSDPA)? Will the currently proposed techniques provide sufficiently improved spectrum efficiency or is more research needed?
- Should support of efficient IP over the air be mandated in terminals from the start, so that spectrum efficiency improvements can be fully realised when (and if) the infrastructure is upgraded?
- Is the access network independence that can be provided by IMS the best model to suit operators' business plans?
- Will sufficiently powerful browsers be available for small handheld terminals to enable users to enjoy the full advantage that IMS brings to services?
- Should the industry specify certain minimum terminal capabilities for IMS to ensure full enjoyment of the services by users?

IMS potentially offers very compelling new service possibilities. However there are many issues to be resolved which result from the nature of the technology. It is now clear that there is significantly more to implementing the full capability for IMS services than was apparent when IMS was introduced as a core network concept in 3GPP. Almost every aspect of the 3G system is affected and whereas 3G was intended to be an evolution of GSM and GPRS, IMS is more revolutionary. The mobile industry will have to decide how the need for essential new technology fits in with business plans and the current investment scenario, paying due regard to the deployment of similar services in other parts of the telecommunications and IT industries.