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Minutes of the
3GPP Future Evolutions Workshop
18th and 19th of October 2001
Helsinki, Finland

Chairman: Niels Peter Skov Andersen, Motorola

MCC Support: Alain Sultan, ETSI

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Future Evolutions Workshop
18-18 October 2001

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Opening of the meeting

The Future Evolutions Workshop took place on 18th and 19th of October 2001. It was hosted by Nokia, in Helsinki, Finland.

The meeting was chaired by Mr Niels Andersen from Motorola and supported by Mr Alain Sultan, MCC, author of these minutes.

After a brief introduction, the chairman gave the floor to Mr Mikko Kanerva, speaking in the name of all the hosts, who welcomed the participant and gave some practical information. He made a short introduction to the workshop in form of a presentation, available as FEW-040, stressing that 3GPP focus too much on debugging the previous releases and developing the next release. He reminded that a similar workshop on GSM held in 1993 led to introduce EFR, AMR, GPRS, DCS, CAMEL and ASCI, but also proposed e.g. satellite and DECT interworking which were never standardised.

After this short introduction, the workshop continued with the presentations from individual companies.

1 Trends and Drivers

FEW-008: *Drivers for mobile network evolution - the vision and the strategy,* Orange

This presentation identifies, from an operators perspective, three of the main drivers in evolving mobile networks: the speed of deployment, the reduction of costs and an ubiquitous accessibility. In order to respond to these drivers, the presentation considers various strategic steps, including access diversity and mobility.

Discussion: Seamless handover between access technologies was not disputed as a principle but it was answered that this might be hard to achieve technically.

FEW-018: *For a Sound and Stable Evolution of 3G Platform*, Joint Contribution of Members of the Vodafone Group

Vodafone recommend to put all priorities for the next 12 to 18 months on debugging and correcting, and stress that a lot of care has to be taken on completing test specs, Security, O&M and charging specifications prior to moving ahead to major new concepts and/or disruptive technologies.

The time lap between "Approval" and "Ready for implementation", which in some cases (e.g. for GPRS) is up to several years due to a high number of CRs, should be reduced as much as possible.

Discussion: Nortel stressed that the CRs are generally due to implementation, so they don't see how to achieve this last point.

One solved concern was the constant impression of "delay" which was due to the previous naming of the Releases (e.g. "Rel99" is viewed by the press as a product which should be ready in 1999....).

The diagram showing in a simplified way the number of CRs per Release per TSG was highly appreciated. It was requested to MCC to publish the real statistics on the number of CRs, as to provide a measurement of the stability of the specs, and to identify when the work on a given release is complete. It was also reminded that it should be avoided to advertise prematurely on the completion of a given release: this also contributes to give an impression of delay.

FEW-005: *Beyond Release 5 – An Operator Perspective*, mmO2 (BT)

For mmO2, Rel5 shall mainly contain an initial phase of IMS, IP transport for RAN, QoS for real time packet services, HSDPA and MExE enhancements.

Beyond Rel5, the major changes should be to enhance the Rel5 IMS, deliver an Integrated Service Environment and, as a general comment, services with justified investments. Some other specific candidates are Wireless LAN Integration, MBMS, Infrastructure Sharing, Open & Secure Terminal Architecture, Service Platform APIs, Multi-party Service Environment.

Discussion: It is generally not clear whether a WI will justify investments or not, at least when it is just started to be investigated. The concept of Feasibility Study was encouraged.

FEW-025: *AWS view beyond Release 5*, AT&T Wireless Services

A summary of the past and current activities is given: Rel99 provided the baseline for UMTS, Rel4 began the optimisations, and release 5 provides the firm foundation for the IMS.

Now, Rel6 should focus on completing the work on IMS, including further optimisations, interworking, and evolution to a PS-domain only network. Future releases should focus on the convergence with internet, especially the services and protocols. Another key point should be the incorporation of Wireless LAN technologies as another radio access technology, with interworking between the UMTS and WLAN networks. Some IP aspects must be studied, mainly the general lack of QoS signalling (application APIs for QoS and "Bearer QoS") and the IPv4 to IPv6 transition. A customer-oriented evolution of the terminal with a dynamic configuration and service environment should become the subscriber's personal access point to available services.

Discussion: On the slide on radio evolution, HSDPA is missing, but this has not to be understood as a lack of interest of AWS on this technique.

There might be a lack of understanding between the IP and the Mobile communities. But for AWS, "they" understand the problem.

Concerning the statement "UMTS terminal should become the customers personal access point to available services", also wired access should be provided. This is not AWS intention to reduce the access to UMTS wireless phone.

FEW-026: *Trends in mobile industry affecting standardization*, Ericsson

Ericsson provide their view on the evolution from the current situation to the "full Real-Time Conversational Multimedia": the evolution will go through Multimedia Messaging, Streaming and Interactive Media, and finally Conversational Multimedia. The "shared experience", or the capacity for two persons to exchange during their communication some pictures, music, etc, will become "everybody's everyday natural part of life". This and other identified trends as sensors and telematics should direct the standardisation work.

Discussion: Vodafone reminded the importance of charging, not mentioned in the presentation. They also stressed that software upgrades over the radio interface have to be much less frequent than they are on the wired access.

FEW-013: *Future of 3GPP Standardisation*, Nokia

Nokia expect that voice will not remain predominant in the forthcoming years: non-real time services will soon take the first range. The different access technologies (Bluetooth, WLAN, 3G) have to be used in conjunction to support these services. On the Core Network side, the "All-IP solution" should be focused on cost reduction. As general requirements, Nokia remind that the options in the standard have to be as low as possible and that a better collaboration within the members of 3GPP will improve the interoperability.

Discussion: The collaboration between 3GPP and IETF should be enforced, according to France Telecom, even though it was reminded that some degree of cooperation already exists.

BT strongly support the idea to reduce as much as possible the number of options.

FEW-006: *Long-Term Issues in Standardisation*, Siemens

Siemens identify some problems on what has been done so far in standardisation (too much driven by technical ideas, commercial viability often neglected, migration issues not considered, benefit and effort of features not balanced, too many options, etc) and proposes that in the future, cooperation with commercial partners (as potentially GSMA) is enforced and a better reuse of the existing technologies (mainly Bluetooth, Hiperlan, Wireless LAN) is performed.

Two examples of services with strong commercial impacts and not considered in standardisation are proposed: UMTS Supported Ad Hoc Networking (where direct UE-UE communication is envisaged) and UMTS Support for Car-to-Car Communication with Emergency messaging or automatic breaking assistance.

Discussion: There is a general support to the idea of improving the commercial viability of new services, e.g. by considering the Business Model at the same time as Stage 1 requirements. But it was also mentioned that it is often difficult to identify which service(s) will be profitable, or at least commercially viable.

FEW-009: *Evolution of Services and Standardisation in an Technically Diverse Environment,* Nortel

Nortel stress that the key success of GSM is the high interoperability (fully standardised radio and network interfaces, allowing roaming and multivendor networks) and this basic rule should be maintained. There are too many independent toolkits at the moment (SMS, CAMEL, IMS, WAP, OSA, MEXE, etc): some "cleaning-up" is needed.

A new trade-off has to be found between "stability" and "agility", i.e. 3GPP should find a solution to handle in different ways the fundamental technologies, evolving slowly, from the fast-changing elements, typically the applications. E.g. the cooperation with "IT worlds" might be enforced.

The process of providing new features should change: market test and interoperability should be taken into account much earlier.

Discussion: there was a general support to the ideas presented here.

2 Services

FEW-021: *Know your subscriber,* One 2 One Personal Communications Limited

One 2 One address the problem of OAM and more particularly of customer care, which will be more complex due to the introduction of many new services, e.g. those based on IMS. This will require new OAM tools.

Other requirements are that new services should be easy to use for the customer, and the number of options shall be keep as low as possible (LCS example has to be avoided).

Discussion: Openwave stress that in some specific cases, having different options is unfortunately necessary, so the problem of options has to be considered on a case-by-case basis.

FEW-010: *Data service requirements for the corporate user*, Research In Motion Limited (RIM)

RIM concentrate on corporate IT, which is foreseen to have an important role to play in UMTS, and conclude that a focus shall be made on making PS domain efficient (reducing signalling overhead e.g. for single packet transmissions), create a simple IMS "edge interface" (i.e. towards external CNs) and improve the partnerships with corporate customers.

Discussion: noted. No disagreement with these ideas was mentioned.

FEW-014: *Mobile Services Driven by Software - and Customers*, Nokia

Nokia stress that one key requirement is to identify and build on a natural evolution path (from SMS to Picture Messaging, then to Multimedia Messaging Service, to finally reach Mobile Multimedia). Different terminals have to be developed for different uses (from simple voice to "Communicator").

They comment that more focus on end-user aspects should be taken in standardisation, and service and application evolution addresses new requirements for connectivity, network and radio standardization. Each standardisation forum has its own role in the framework: cooperation is needed and increasingly critical.

Discussion: also noted.

FEW-033: *Evolution of the Services API*, Motorola

Motorola recommend using Java 2 Platform Micro Edition. The foreseen advantages of developing "J2ME" APIs are portability of the code, easy scalability to work with the J2SE (Standard Edition) and J2EE (Enterprise Edition) platforms -used respectively by PCs and servers-, support of rich, dynamic and interactive content delivered by 3rd party content providers and developers, etc. The collaboration between 3GPP and the Java Community Process (JCP) should be enforced.

Discussion: MExE and other tools which have been developed by 3GPP earlier are "minor technologies" compared to Java, according to Motorola.

FEW-027: *Supporting QoS-enabled APIs in 3GPP UE*, Ericsson

Ericsson propose to decouple as much as possible Applications from Bearers, the link between these two areas being standardised APIs, offering guaranteed QoS to the applications

independently of the transmission technique. The possible parameters for the API are: Media Description using MIME, SDU Format Information, Bit Error Rate, Delay Bound, Packet Loss Ratio and Packet Handling Priority.

Discussion: Nortel stressed that some APIs already exist between applications and "operating systems" (as IP connection). But some communication with IETF is needed to make them aware of 3GPP specific requirements. Ericsson do not provide any specific time scale for their proposal at this stage.

The statement "An open API allows 3rd party applications to request QoS in an integrated terminal." (slide 6) does not mean to restrict the use of integrated UE. The cases of "split" UE (i.e. dissociated MT and TE) and of UE containing one MT and several TEs have also to be envisaged.

The impact of handover from 3G to 2G on this API have to be investigated carefully.

FEW-030: *Multimedia Broadcast and Multicast Service (MBMS) Enhancement in UTRAN*, Samsung

It is proposed to improve broadcast mechanisms and introduce multicast in the system (as approved at last SA plenary). Two approaches are envisaged: an evolutionary approach with modifications on MAC-c/sh and introduction of a "BMSCH" (Broadcast/Multicast Shared Channel), and a revolutionary approach, using a secondary carrier.

Discussion: For Vodafone, the service should be available everywhere, i.e. as well where there is only GSM and GPRS coverage, and not only for UMTS. On slide 14, the case of a use of a separate frequency implies for a UE with a single receiver to perform inter-frequency switching: this might disable the mobile to receive paging notification in the meantime (this is against the service requirements, being developed by S1 but not stable yet).

3 Networks (RAN and CN)

FEW-036: *3G Future Evolution and roadmap*, Hutchison 3G

Hutchison 3G propose here a list of examples of services of different categories as Financial (Micropayment, Mobile banking, Shopping, Stock Trading, Recognition techniques), Location Based (Advertising, Find a friend, my car, restaurant etc.), Control (Remote control of appliances), Multi-user applications (Video chat, Game highlights), Multimedia (Voice/multimedia over IP, Adult chat line), Information (Live news, Transportation, Preload info prior to travelling).

FEW-029: *A Proposal for All IP End Architecture for UMTS*, Cisco Systems Inc

Cisco Systems describe an evolutionary end architecture for the Core Network and the Radio Access Network. The architecture is based upon five fundamental principles: "All IP" Radio Access and Core Networks (i.e. IP should be used on all interfaces), separation of control and user Planes, separation of Mobility and Call Control Functions, distributed (loosely coupled) architecture and access independent Core Network. They recognise that many of these concepts have already been adopted at varying degrees into the Release 5 architecture but propose to adopt these principles to fullest extent, as to enable the UMTS architecture to be "universally adaptable and possibly future proof".

FEW-035: *3G Future Evolution and roadmap*, Source: 3G.IP

3G.IP propose a roadmap for 3G evolution: reusing the ITU concept of "family of systems", it is proposed to have a technology-inclusive approach, in order to allow the addition of new

technologies as DAB or Wireless LAN, and to enable enhancements to the existing standards. Whereas a multiplicity of AN types should be supported, the CN should be simplified, e.g. by removing the CS domain and supporting only a minimum set of basic service components.

FEW-020: *Evolution of the Network Infrastructure,* Motorola

Motorola remind the challenges Optimised Voice Service has to consider, knowing that Conventional VoIP over the air interface is roughly 70% less efficient than GSM FR and each basic SIP message is roughly 93% less efficient than a similar 24.008 CC message. They identify some needed tools, as header removal and/or compression techniques. They propose to have OVS in GERAN in Rel5, the main improvements of Rel6 being the addition of secure header stripping for UMTS, secure synchronisation over air channel, VoIP proxy in RNC plus Iu/IMS IE signalling IE fields to support, and dedicated IP signalling bearer with according QoS.

Discussion: Nortel reminded that header compression is problematic in case of TE and MT separation, but this can be solved according to Motorola.

Additional delay due to header compression has to be also carefully investigated.

It was not clear for Nortel what the difference is between the present situation in 3GPP and the proposal. It was clarified that the aim is to introduce Header Removal in UTRAN.

FEW-019: *NEC's vision on Evolution of CN and its New Interfaces*, NEC

For NEC, the 3 keys to operator's success are to increase the operator's business opportunity for IP-based services, to improve the performance of IP-based services and to promote the integration of various wireless systems into 3GPP network.

On this base, NEC propose to use an advanced IMS, defined as an IP based CN, that can absorb current PS domain, and to define the interfaces between this advanced IMS towards ISP and towards RANs.

Discussion: For Vodafone, reengineering the IP connectivity network does not provide any clear new revenue, at least as it is presented here.

FEW-007: *Short Term Evolution Features*, Siemens

Siemens stress that Rel6 shall not be a major Release. Rel6 shall be seen as a consolidation release, with the aim to improve the overall functionality, stability and performance of 3G networks. Among the topics to be studied in the next future are the Multiple Antenna Concepts, MBMS, scalability of application to the terminal, and improvements in security.

Discussion: noted. No disagreement with Siemens' views was mentioned.

FEW-003: *RAN sharing*, Telia

Telia propose, as an important feature of Rel6, to enhance the Rel5 Iu-flex work towards a fully shared UTRAN, between different operators, recognising that this implies important changes to the present system. The intention is to largely lower the cost to be carried for each operator in building the 3G networks.

Discussion: Compatibility with Rel99 is far from being a trivial problem, according to the chairman. A possible solution is to route the call from the AN to the CN according to the user identity.

The regulatory requirements seem to differ between the countries: in Sweden, it is authorised to share a frequency band between several operators whereas it might not be the case in Germany. BT are interested by this topic, and think that a general Feasibility Study has to be made to identify the problems and all the potential solutions.

FEW-037: *Global Standardization of Long-term All IP,* NTT DoCoMo

NTT DoCoMo propose to converge towards a final target architecture composed of one CN having three different layers: a "IP-transport" layer, a "network management" layer (handling in fact the 24.008 and the MAP signalling), and a "service support" layer handling the application. This CN will have the ability to connect to different radio access technologies (WCDMA, WLAN, etc.). They call it the "IP^2" network.

One particularity of the target architecture is said to be that there is no more AN versus CN separation.

Discussion: Telia would have more explanations on the link between this proposal and theirs about the Access Network...

For Siemens, the evolution path is not very clear, as everything seems to be changed compared to the current architecture.

For the chairman, this is just another way of representing the network, with more focus being made on the transport layer, but with no major change compared to the current network.

FEW-015: *Future direction for the network architecture,* Nokia

Nokia propose evolutions in 4 different areas: make the AN fully independent to enable the use of complementary access technologies as part of 3GPP System (e.g. IEEE 802.11, HiperLAN2, Bluetooth, ADSL); optimise the User and the Control planes, by streamlining the architecture for the provision of PS bearer services; accommodate the Mobility Management to take complementary access technologies and streamlined user plane into account; and optimise the multiradio environment in particular by managing the UTRAN and GERAN as one network, especially for RRM.

Discussion: noted.

FEW-012: *Multi access,* Telia

Telia believe that Rel6 should focus on developing as far as possible the interworking between WLAN and UMTS, taking into account aspects as security, mobility, QoS and charging. The target architecture should allow for different WLAN standards to interwork with UMTS.

This presentation addresses several technical possibilities to connect WLAN to UMTS, stressing on the need or not to have a smart card.

Discussion: There are some ongoing activities at SA1 on this topic. The impacts on standardisation, if any, have to be studied in the WGs.

FEW-032: *Stand-alone data-cell for UMTS,* Nortel Networks

Nortel notice that most of the local traffic is data and is highly dissymmetric, and propose 2 solutions to cater for this, based on stand-alone nodes called "Node-S" and "Node-W".

The Node-S, which interconnects with RNC and Node-B (via Iub), basically adds downlink only carrier(s) to carry high bit rate packet data, via a "Downlink shared channel on a standalone carrier" (Standalone DSCH) as layer 1. The UE remains connected with UTRAN via the FDD dedicated channel: the downlink "fat pipes" increase downlink capacity, but mobility remains managed by the UTRAN R99 architecture. The uplink is the classical FDD one (Node-S just add downlink capabilities), so this solution works only where there is umbrella coverage of classical FDD.

The Node-W will use 802.11 MAC/L1instead of the UMTS FDD L1 and so integrate the WLAN technology to UMTS.

Discussion: Node-S is proposed as stand-alone from Node-B (another solution would have been to modify Node-B) because one of the key requirements for Nortel was to minimise the impact on the already installed infrastructure.

Even in the Node-W, the impact on already-specified layers 2 and 3 is foreseen to be very limited.

FEW-017: *Evolution of Radio Networks and Technologies,* Joint Contribution of Members of the Vodafone Group

Vodafone remind that GSM is and continues to be a vital part of the business, hence optimisation and development shall continue.

Any evolution must consider GSM as well as UTRAN, and evolutions must be driven by the need to minimise cost and to increase revenue.

Minimising options, keep the interfaces open and going on enabling multi-vendor operation are still and will continue to be essential.

FEW-023, FEW-022: *Meeting the operators needs,* One 2 One Personal Communications Limited

One 2 One remind that additional frequency bands will be provided to 3G systems, and propose forthcoming releases to focus on mechanisms that allow the maximum possible flexibility in allocating spectrum resources, as dynamic modulation schemes, software defined radio techniques, variable duplexing capabilities. This work should be driven in particular by the regulatory constraints on spectrum utilisation, and should cover network sharing in all its aspects, including spectrum pooling, and use of multiple types of access networks and load sharing between these different technologies. They believe that this will bring to the surface all the problems with the current mobility management, which will need radical improvements.

Discussion: A new WI was already approved at Beijing on what to do with the extra band, and this presentation fits to this study.

4 Radio Technologies

FEW-031: *Direction of Future Evolution,* Fujitsu

Fujitsu propose to start feasibility studies to incorporate enhanced-OFDM and WLAN into UTRAN, with the idea to answer to the demands for high speed data.

FEW-016: *3GPP Radio Evolution - GERAN and UTRAN,* Nokia

Nokia address different potential improvements in the field of the radio interface, including MIMO (for UTRAN and GERAN), and Downlink Transmit Diversity, Multi- Carrier GERAN, High Speed Downlink Packet Access (HSDPA) Phase 2, use of Extension Band, TDD Mode.

Discussion: Vodafone reminded that the number of options has to be kept as low as possible.

On TDD, Nokia clarified that what has been developed so far might have to be simplified to make it a success.

FEW-028: *Evolution of the WCDMA - High Speed Uplink Access,* Ericsson

Ericsson review several possibilities to increase the uplink capacity and delay, improve the coverage of high data rates and provide faster switching. These possibilities are mainly advanced antenna solutions, improved interference management, improved receiver structures, improved coding, minimised unnecessary transmission and reduced transmission power. For reducing the delay, the following areas of study are envisaged: Internet congestion control optimised for radio environments, UTRAN internal delay, Shorter radio interface RTT, UE internal delay.

Discussion: On "UE internal delay", it is clarified that the stress is on Layer 1 and possibly layer 2 but not higher, so this might not be incompatible with the UE split mentioned earlier.

FEW-011: *Spectrum efficiency,* Telia

Telia just want to stress that RAN should focus its work for Rel6 on techniques for improved spectrum efficiency. Possible techniques are: Dual receivers replacing compressed mode, Improved HO measurement accuracies, CPICH cancellation, Multi code usage, Low rate/scalable speech codec, MIMO and MUD.

FEW-034: *Optimization of IMS bearers in GERAN,* Ericsson

Ericsson propose to have in Rel5 the support by GERAN of the streaming, interactive and backgound QoS classes to support IMS services. The conversational class will be theoretically supported, but in an inefficient way as no specific new tool will be provided: the ECSD type of channel coding may introduce a too-long delay and the EGPRS type of channel coding is not optimised for conversational services (EGPRS bearer in GERAN can cost 5 to 10 dB in link performance compared to traditional CS speech). Rel6 will possibly provide optimisations to support conversational more efficiently. The optimisations are to be done in the field of interleaving depth, RLC/MAC header optimisations for dedicated channels, more efficient RTP/UDP/IP and TCP/IP header adaptation schemes and equal versus unequal error protection.

FEW-038: *Adaptive Antennas in Evolving IMT-2000 and Complementary Systems,* ArrayComm

ArrayComm propose to use Adaptive Antennas (which is a combination of antenna arrays and signal processing) to increase the capacity by 6 for GSM/GPRS and by 8 for W-CDMA.

5 Summary

The chairman, with the help of the MCC support and the SA vice-chairmen, provided a summary in a form of a 11-slide presentation, outlining the basic assumptions, the high level requirements, the focus areas and some service examples. A summary of the discussions is finally proposed,

stressing that the main focus should be to correcting and complete the existing standard before introducing any new major change, to optimise and fully utilise the existing standard, to reduce the number of options and the deployment costs, and to keep in mind the spectrum efficiency.

This document was completed and corrected on-line, and is available as FEW-039.

Some delegations (3G.IP, Telenor and DoCoMo in particular) were somehow disappointed by the conclusions of this workshop, mentioning that its main subjects, the evolutions and the elaboration of the long-term view of 3G network, were not sufficiently addressed.

Other delegations (as e.g. Vodafone) answered that the plan for the forthcoming years is now very clear: it consists in correcting and stabilising Rel97, Rel99, Rel4, and complete and then correct the Rel5 work. For Rel6, several items have already been identified: this gives work to 3GPP for several years...

Annex

Tdoc list

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