The 3GPP vision

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The 5 IMT 2000 terrestrial interfaces agreed by ITU-R

- **UTRA FDD**
  - Direct sequence
  - UTRA TDD
    - High & low chip rates

- **UTRAN TDD**
  - Time code
  - UWC 136

- **cdma2000**
  - Single carrier
    - UWC TR45

- **DECT**
  - Multi-carrier
    - 3GPP2

- **3GPP**
  - Frequency time
    - ETSI
What is 3GPP?

3GPP is:

A collaborative agreement between Standards Development Organizations (SDOs) and other related bodies for the production of a complete set of globally applicable Technical Specifications and Reports for:

- a 3G System based on the evolved GSM core network and the Universal Terrestrial Radio Access (UTRA), FDD and TDD modes;
- the Global System for Mobile communication (GSM) including GSM evolved radio access technologies
Collaboration between 3GPP & 3GPP2

- Considerable ad hoc collaboration as many companies active in both groups
- Joint meetings since 1999 to address interoperability, roaming and harmonization needs, centred on:
  - Radio access
  - Terminal design
  - Core network
- Harmonization also being enhanced by adoption of external common specifications
  - Notably, IETF RFCs (approx. 40)
  - RFC 3113 lays down basis of co-operation between 3GPP and IETF
Collaboration between 3GPP & 3GPP2

- 1999 "Hooks & Extensions" workshops
  - Interoperability between radio access technologies
  - Dual mode terminals
- 2001 Harmonization of HSDPA (3GPP) and 1xEV-DV (3GPP2)
  - Various issues noted:
    - terminal design; services; spectrum; implications of All-IP
  - Initial attention on
    - common definitions for channel models and traffic models
    - common physical requirements for future terminal designs
  - Joint meeting of core network experts April 2002
    - All-IP core network harmonization
    - already significant commonality between 3GPP and 3GPP2 core networks
  - Joint meeting of radio experts in June 2002
    - radio-related aspects
3GPP is:

- Open to all national/regional Standards Development Organizations irrespective of their geographical location (Organizational Partners)

Organizational Partners

- CWTS
- ETSI
- ARIB
- TIC
- TTA

A GLOBAL INITIATIVE
Market Representation Partners

3GPP receives market advice from the following organizations:
Observers

Observers are Standards Development Organizations (SDOs) who have the qualifications to become future Organizational Partners.

3GPP currently has three Observers:

- Telecommunications Industries Association (TIA)
- Telecommunications Standards Advisory Council of Canada (TSACC)
- Australian Communications Industry Forum (ACIF)
Individual Members

3GPP is:

- Open to the members who belong to each Organizational Partner
- Currently, more than 450 Individual Member companies are actively engaged in the work of 3GPP
3GPP

Organizational Partners' Standardization Process

Support Functions

Technical Specifications

Technical Specification Groups

Project Co-ordination Group

INDIVIDUAL MEMBERS

Technical Contributions

International Recommendations

ITU

IMT 2000 Contributions via existing processes

Regulators/Governments

Organizational Partners

Market Representation Partners

PARTNERS

Organizational Partners' deliverables

Technical Specifications via existing processes

3GPP
How does 3GPP work?

3GPP internal structure

Project Co-ordination Group

TSG Radio Access Network
TSG Core Network
TSG Terminals
TSG Service and System Aspects
TSG GSM/EDGE Radio Access Network

Technical Specifications
What is the relationship between 3GPP and ITU?

ITU-R

3GPP contributes to the ongoing ITU Rec M.1457 (IMT.RSPC) activity:
- specification work is performed in the Partnership Project
- the resulting specifications are transposed by the Organizational Partners (OPs)
- the OPs provide inputs to update Recommendation M.1457
  - according to the OPs’ individual working arrangements (e.g. input to ITU-R via Individual Members)
  - according to the ITU timetable

ITU-T

- Special Study Group “IMT-2000 and Beyond"
- 3GPP liaises closely and contributes to ITU-T IMT-2000 “road map” Direct participation of ITU in PCG meetings
Rec M.1457

- High level description of air interfaces
- Refers out to the SDOs' standards (ETSI, T1, etc.)
Contributions to ITU-R

- 3GPP produces updates of specifications every 3 months
- ITU-R announces date for contributions to update M.1457
- 3GPP Partners agree which versions will be the basis of submissions to ITU-R…
- …allowing sufficient time for transposition of the 3GPP specifications into SDO standards before submission to ITU-R
- e.g.

March | June | September | December

Transposition to SDO standards & submission to ITU-R
ITU-T SSG

Rec Q.1741.1
- 3G road map
- Refers out to the SDOs' standards (ETSI, T1, etc.)

Approved
Updated
Transposed
Submitted by SDOs to ITU-R
Principle

Do the work where the right competence exists

- ITU – excellent for the global recognition
- 3GPP – excellent for detailed technical work

- The model works well!
- ITU-R, ITU-T, 3GPP all satisfied by the model
- All parties wish it to continue
The paths to 3GPP technologies

GSM → EDGE → GPRS → W-CDMA (IMT-2000 family)

- **GSM**: Circuit Switched, Voice & low-speed data
- **EDGE**: Packet Switched, Voice & medium-speed data
- **GPRS**: PDC, High Low
- **W-CDMA**: FDD TDD, Voice & high-speed data, IP (option)

Paths from other technologies, e.g. IS-136, PDC...
Evolution to 3GPP technologies

- **Japan**: PDC, PHS, W-CDMA
- **Europe**: GSM, GPRS, W-CDMA & TD-SCDMA
- **USA**: TDMA, GPRS/EDGE, W-CDMA
- **China**: GSM, GPRS/EDGE, W-CDMA & TD-SCDMA

- **GSM**: 2G, 3G
- **GPRS/EDGE**: 2G, 3G
- **TDMA**: 2G,
- **PDC, PHS**: 2G
- **W-CDMA**: 3G
- **TD-SCDMA**: 3G

- **1997** 2G
- **2002** Today
- **2005** 3G
A smooth evolution to 3G

- In fact, the evolution path is already more than 10 years old!
- Remember this?
A smooth evolution to 3G...

...and beyond

SMG 5

3GPP ad hoc

SMG

3GPP

(evolution beyond Release 6)
Rigorous development

- **Professional project management**
  - Permanent, paid project team
  - Significant resources deliberately committed
- **Thorough testing**
  - Interoperability is paramount
  - Major investment in TTCN testing
    - 1 M€ invested in 2002 alone
    - Permanent team to draft and deploy TTCN
3GPP Work Item Management

3GPP project management is based upon a concept of …

Features
- F1
- F2
- F3

Building blocks
- B1
- B2
- B3
- B4
- B5
- B6

Work tasks
- W1
- W2
- W3
- W4
- W5
Project plan

- All Features, Building Blocks and Work Tasks are contained in the 3GPP Project Plan
- Plan based on Microsoft Project
- Gantt presentation available on 3GPP web site
- Open access – everyone can view the plan

http://www.3gpp.org/3G_Specs/wi_management.htm
3GPP Releases

- **Specifications are grouped into “Releases”**
  - A mobile system can be constructed based on the set of all specifications which comprise a given Release
  - A Release differs from the previous Release by having added functionality introduced as a result of ongoing standardization work
The 3GPP Specification Releases

- **Release 99**
  - content frozen December 1999
- **Release 4**
  - content frozen March 2001
- **Release 5**
  - functionality frozen March 2002
- **Release 6**
  - functionality to be frozen 2003 (second half?)
Release 99

GSM

Phase 1

Phase 2

Rel 96

Rel 97

Rel 98

Rel 99

3G

Rel 4

Rel 5

1992

1993

1994

1995

1996

1997

1998

1999

2000

2001

2002
Release 99

• **Main feature:**
  – Creation of the Universal Terrestrial Radio Access (UTRA) both in FDD and TDD (3.84 Mcps) modes. (Fully referenced in ITU-R M.1457)

• **Other features:**
  – CAMEL phase 3
  – Open Service Architecture (basic version)
  – Location Services (LCS): improvements and corrections of the basic version
  – Narrowband AMR (new codec)

• **Lot of other smaller uncorrelated improvements (multicall, HSCSD for 2G, etc)**
Current operational systems are based on Release 99:

- Japan - FOMA
- Isle of Man - Manx Telecom
- Monaco - Monaco Telecom
Release 4

Main features:

- Low Chip Rate TDD (1,28 Mcps) – i.e. TD-SCDMA
- GERAN concept established (EDGE/GPRS Iu interface)
- Bearer independent Circuit Switched network architecture
  - the MSC is split in “Media Gateway” for transport and “MSC server” for signalling
- Streaming
  - Retrieval of real time video (e.g. movie playback)
- Multimedia messaging
  - Enhanced messaging (rich text formatting and still image)
  - Multimedia messaging (multimedia attachments)
Release 4

• Lot of other uncorrelated smaller improvements including:
  – UTRAN repeater specification
  – Real time facsimile
  – Transcoder Free Operation (mobile to mobile)
  – Improvements in: MExE, USIM toolkit, AT command, LCS, emergency calls in CS domain, security, etc.
Release 4

- Introduces TD-SCDMA
- Early operational systems in China will probably be based on Release 4
- Release 4 compliant products on show at 3GSM Cannes, 2002
Release 5

- **Introduces IMS - IP-based Multimedia Services**
  - In two phases (Phase 1 in Release 5)
  - IP core network
  - Handling of multimedia services using SIP signalling and the bearers offered by the PS domain
  - Manufacturers already demonstrating IMS solutions
- **HSDPA - High Speed Downlink Packet Access**
  - Opens up throughput in order of 10Mbit/s
  - Included in latest ITU-R update of M.1457
- **Both are enabling technologies**
  - Providing opportunities for advanced services
  - Commercial decision by industry whether Release 5 will be basis of W-CDMA systems in short/medium term
Release 5

- **Other major features:**
  - Wideband AMR (new 16 kHz codec)
  - CAMEL Phase 4
    - new functions such as mid-call procedures, Interactions with Optimal Routing, etc.
  - End-to-end QoS in the PS domain
  - Global Text Telephony (GTT) (i.e. real time text)
  - Extended transparent end-to-end PS mobile streaming
Release 5

- **Other features:**
  - IP transport in UTRAN
  - Intra domain connection of RAN nodes to multiples CN nodes (i.e. one RNC serving two or more MSCs within the same network)
  - Emergency calls (circuit switched)
  - Messaging enhancements (EMS, MMS)
  - Improvements of Radio Interface (including UMTS1800/1900)
  - Enhancements in GERAN, LCS, OSA, MExE, etc.
Release 6

• **Currently planned for 2nd half 2003:**
  – IMS "Phase 2" (including IMS Messaging, IMS Group Management)
  – Multimedia Broadcast/Multicast Service (MBMS)
  – Push services
  – Wireless LAN interworking
  – Network sharing (maybe Release 5)
  – Digital Rights Management
  – Speech recognition and speech enabled services
  – Identity Portability (formerly Number Portability)
  – Presence (maybe Release 5)
  – Radio optimisation
  – Priority service
  – Generic user profile
  – Enhancements to:
    • MExE, LCS, OSA, emergency calls in PS domain and IMS
And what's beyond Release 6?

• 3GPP studies already looking beyond Release 6

• New areas to explore, e.g.
  – New radio modulation techniques
  – Exploitation of high speed packet operation
  – Exploitation of IP
  – Wireless LANs – threat or opportunity?

• Ultimately, the solutions will be determined by the market
Conclusion

• The future's bright…
• We know where we've come from
• We know where we are now
• We have very high confidence in what we're producing
• And…
• …we know where we're going!