



ETSI

Progress in developing Fixed/Mobile Standards

Adrian Scrase

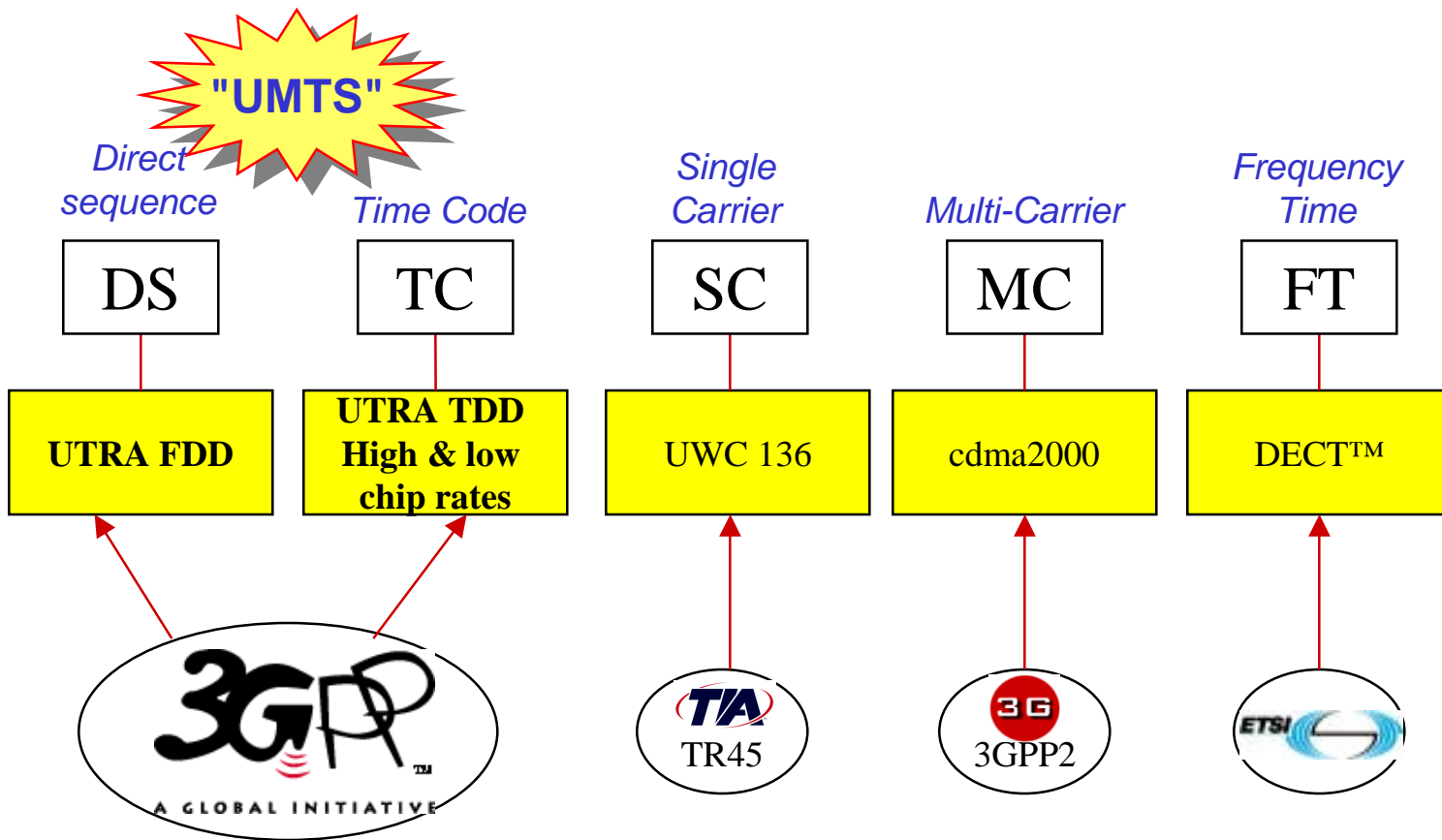
CTO, ETSI



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The IMT-2000 family

The 5 IMT 2000 terrestrial interfaces agreed by ITU-R



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Overview of 3GPP

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:

- GSM, including GSM evolved radio access technologies (GPRS/EDGE/GERAN)
- a 3G System based on the evolved GSM core network and the Universal Terrestrial Radio Access (UTRA), FDD and TDD modes;

○ 3GPP has no legal status, but:

- The 3GPP results are jointly owned by the Organizational Partners (i.e. the SDOs)
- The Organizational Partners transpose the results into their own deliverables (e.g. Standards)

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What does 3GPP do?

- o 3GPP prepares and maintains specifications for the following technologies:

- GSM
- GPRS
- EDGE
- W-CDMA - FDD (Frequency Division Duplex)
- TD-CDMA - TDD (Time Division Duplex) - in High Chip Rate and Low Chip Rate (TD-SCDMA) modes



NTT DoCoMo

*i.e. all of the technologies
on the GSM evolution path*

**A single home for all these technologies helps to ensure
global interoperability**

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Partnership and Membership

❑ 3GPP is composed of:

❑ **Partners:**

- Organizational Partners
 - 3GPP is open to all officially-recognized standards organizations irrespective of the geographical location
- Market Representation Partners
 - invited by the Organizational Partners to offer market advice and to bring a consensus view of market requirements (e.g. services, features, functionality)

❑ **Individual Members**

- Hundreds of Individual Member companies are actively engaged in the work of 3GPP



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Organizational Partners



ETSI
Europe

CCSA
China

TTA
S Korea

ARIB
Japan

TTC Telecommunication
Technology
Committee
Japan

ATIS
Alliance for Telecommunications
Industry Solutions
USA

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Market Representation Partners



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Observers

3GPP currently has three Observers:

o Telecommunications Industries Association (TIA)



o Information and Communications Technology Standards Advisory Council of Canada (ISACC)



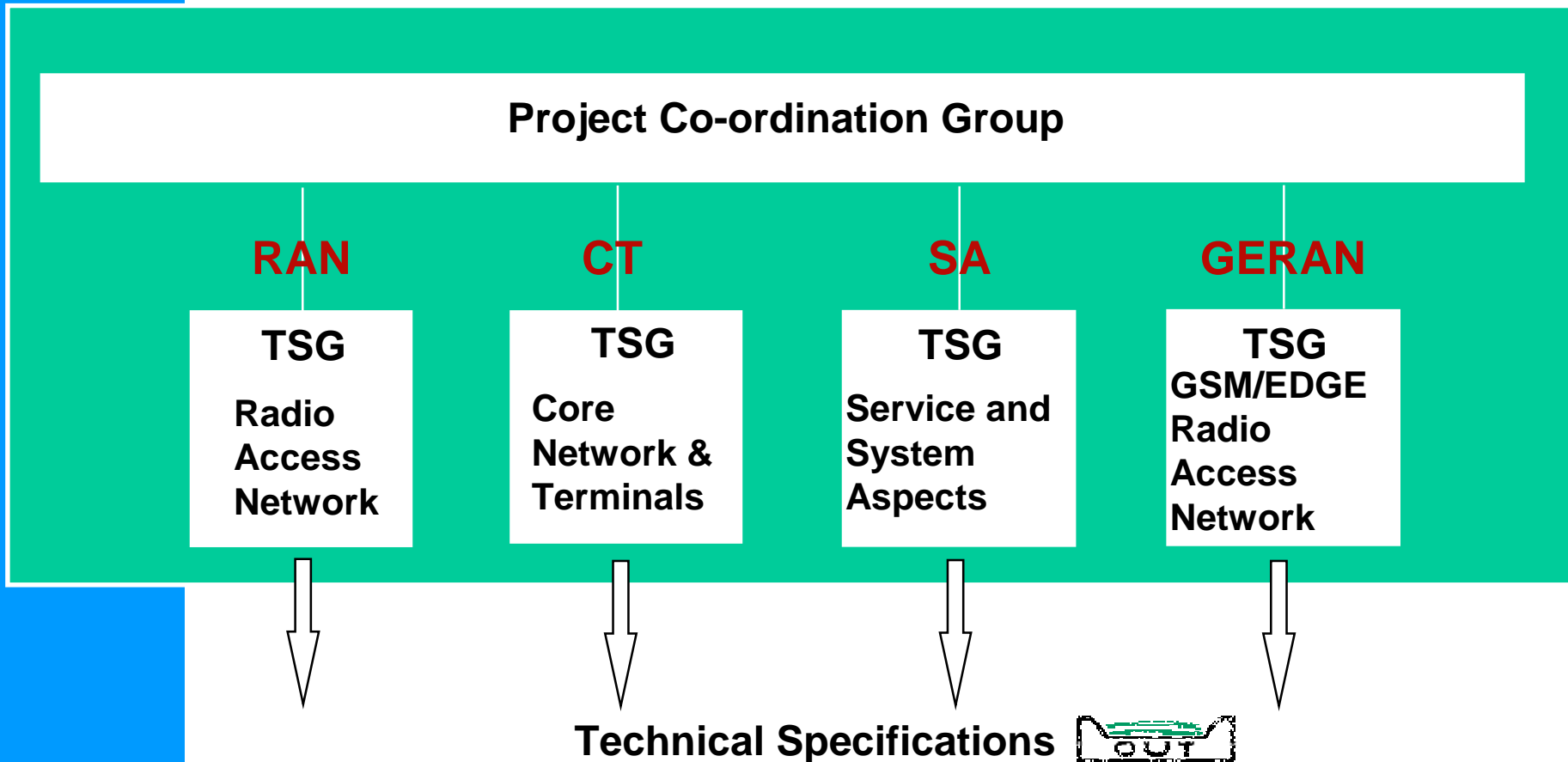
o Australian Communications Industry Forum (ACIF)





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3GPP New Internal Structure



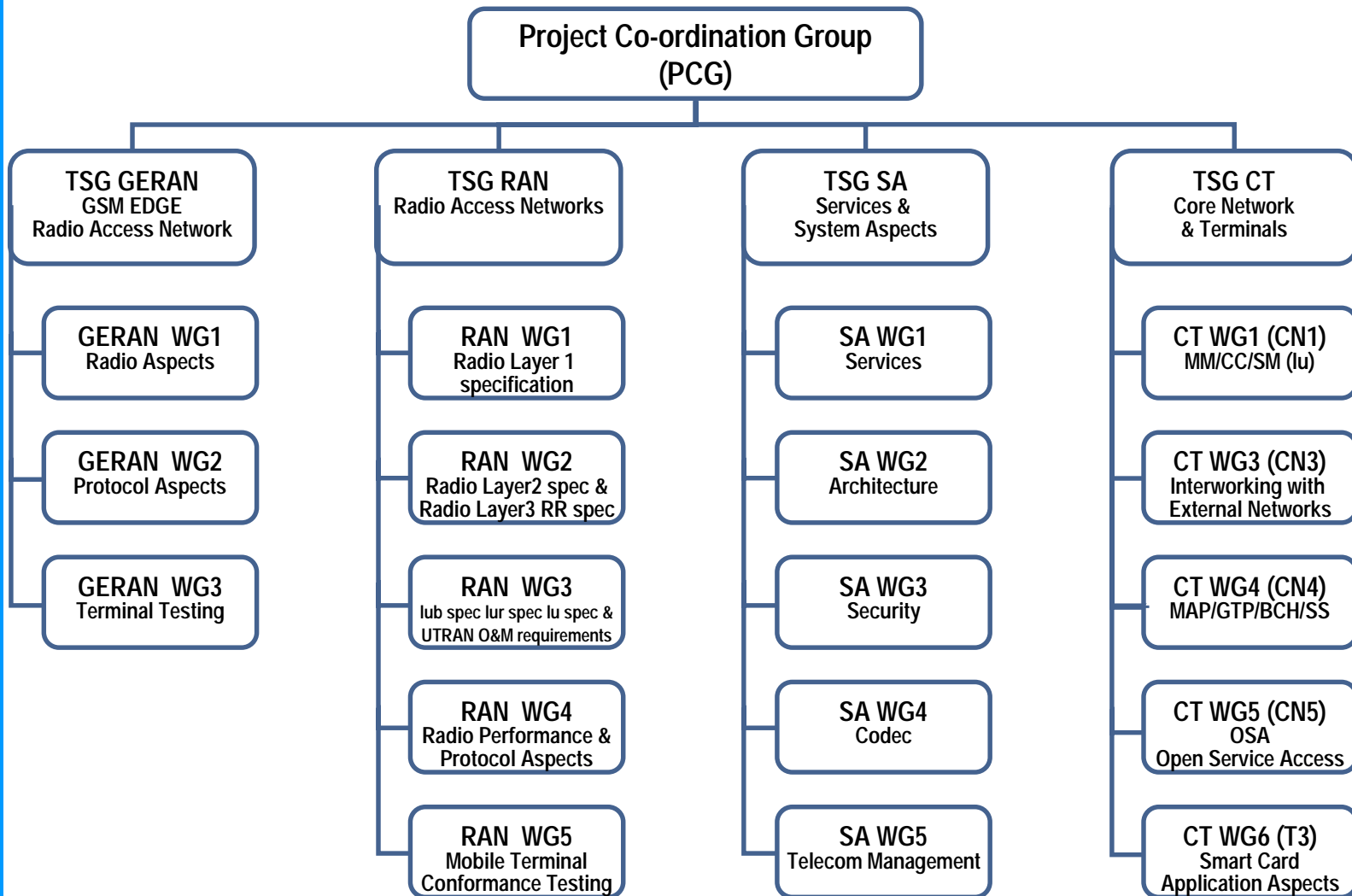
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3GPP Technical Organization



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The Mobile Competence Centre

3GPP has a Mobile Competence Centre (MCC)
providing
comprehensive project support

MCC:

- o is located at the ETSI HQ in Sophia Antipolis, France
- o has 24 full time personnel
- o is an International team of 14 nationalities
- o is ISO 9001:2000 compliant



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ITU referencing of 3GPP results

- o 3GPP does not contribute directly to the ITU
- o Formal contributions to ITU Study Groups are made by ITU members using existing national/regional processes
- o ITU - R
 - Regular updates submitted to ITU-R Recommendation M.1457
 - High level description of IMT-2000 air interfaces
- o ITU - T
 - Collaboration with ITU-T Special Study Group on "IMT-2000 and beyond"
 - Regular updates submitted to ITU-T Recommendation Q.1741
 - Framework for IMT-2000 networks



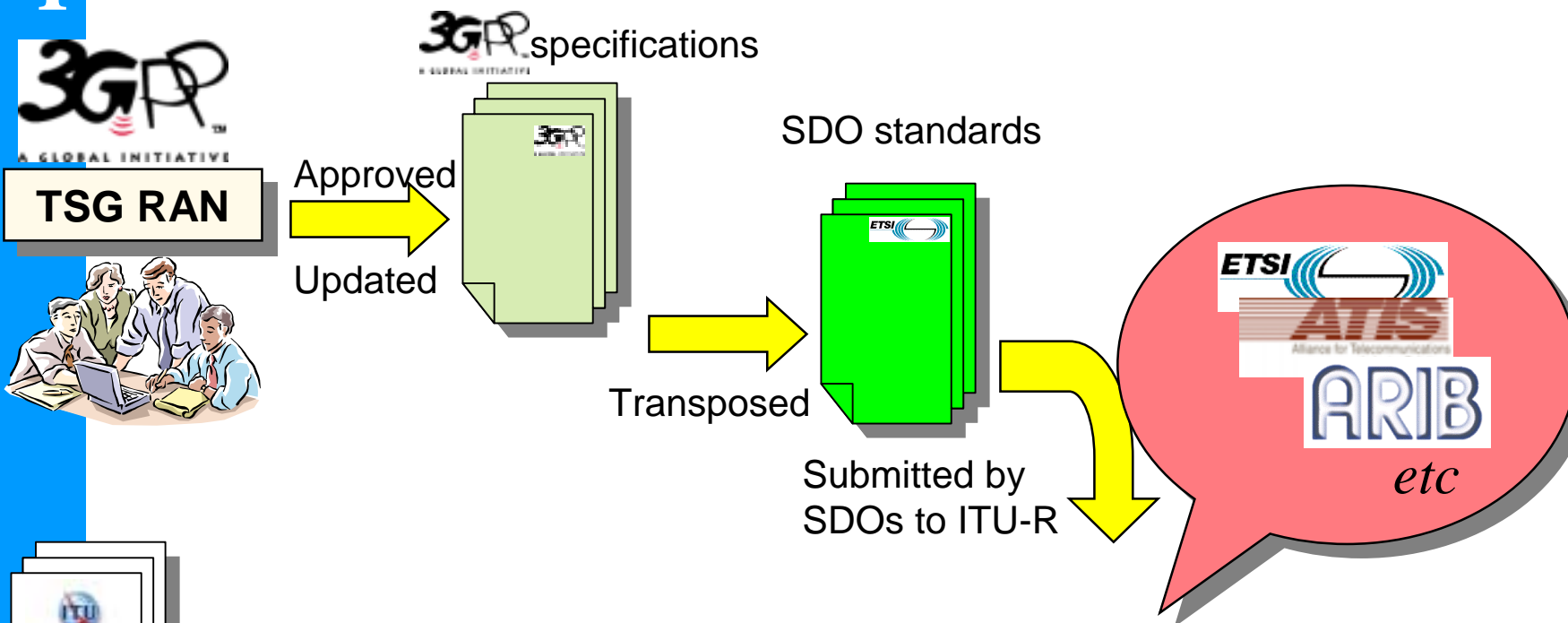
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ITU-R Working Party 8/F



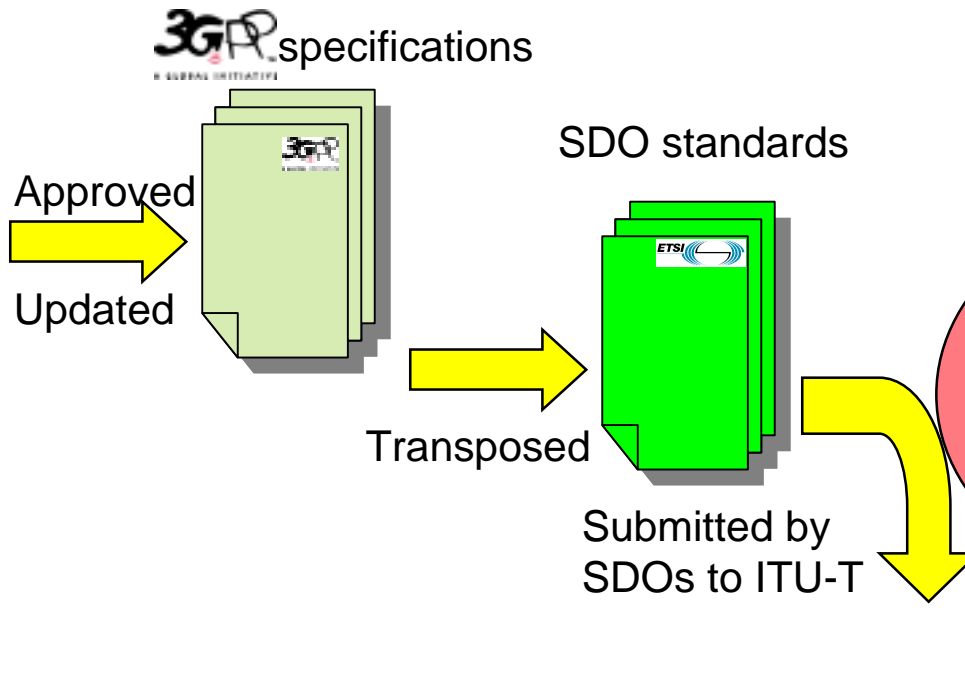
Rec M.1457

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



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ITU-T Study Group 19



Rec Q.1741

- 3G road map
- Refers out to the SDOs' standards (ETSI, ATIS, etc.)

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Release '99

- Release '99 - December 1999
- Main features:
 - Creation of the Universal Terrestrial Radio Access (UTRA) both in FDD and TDD (3.84 Mcps) modes
 - Fully referenced in ITU-R M.1457
 - Narrowband AMR (new codec)



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Release 4

o Release 4 - March 2001

o Main features:

- Bearer independent Circuit Switched network architecture
 - the MSC is split into "Media Gateway" for transport and "MSC server" for signalling
- Low Chip Rate TDD (1.28 Mcps)
 - i.e. TD-SCDMA
- Streaming
 - Retrieval of real time video (e.g. movie playback)
- New Messaging Systems
 - Enhanced messaging (rich text formatting and still image)
 - Multimedia messaging (multimedia attachments)
- GERAN concept established (EDGE/GPRS Iu interface)



Siemens press picture

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Release 5

o Main features:

- IMS - IP-based Multimedia Services
 - All the core network elements for multimedia services
 - Based on SIP (from IETF) and PS bearers
- HSDPA - High Speed Downlink Packet Access
 - Data only, downlink speeds of up to 10Mbit/s
- And much more!
 - Wideband AMR codec
 - End-to-end QoS
 - Intra domain connection of RAN nodes to multiple CN nodes
 - i.e one RNC serving two or more MSCs within the same network
 - opens the way to Network Sharing
 - Enhancements to messaging, security, etc...



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What does IMS provide?

- o IMS provides:
 - IP Transport in the Core network
 - IP Transport in the UTRAN

- o And this therefore provides the possibility for:
 - End to end IP services
 - Increased potential for service integration
 - Easy adoption and integration of instant messaging, presence and real time conversational services



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What does HSDPA provide?

HSDPA (High Speed Downlink Packet Access):

- Supports services requiring instantaneous high data rates in the downlink
 - e.g. Internet browsing; video on demand
- May be deployed in both Frequency Division Duplex (FDD) and Time Division Duplex (TDD) modes (both high and low chip rates)
- Various configurations defined, offering data rates of up to 10Mbit/s



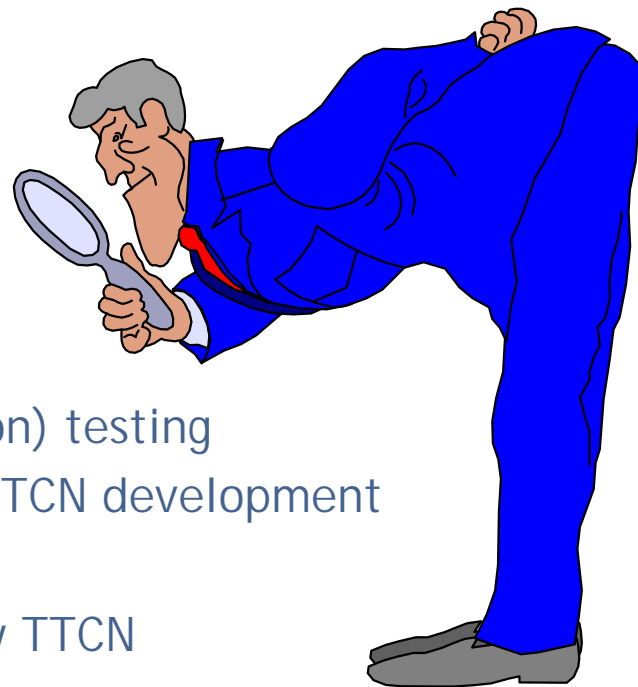
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Interoperability Testing

o Thorough testing

- Major investment in TTCN (Tree and Tabular Combined Notation) testing
- Well over 4 M€ already invested in TTCN development
- Interoperability is paramount
- Permanent team to draft and deploy TTCN
- More than a standards issue

- Testing provides vital feedback into the technical specification work
- ETSI “Plugtests™” events feature 3G interoperability testing



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Release 6

o Main features:

- IMS Phase 2, including...
 - Interworking IMS-CS networks; IMS - non-IMS networks; IMSCOOP (with 3GPP2)
 - Group management (Presence, Messaging, Conferencing)
 - IMS Charging
 - Lawful interception
- MBMS
- Enablers for services like PoC (with OMA)
- WLAN interworking scenarios 1 - 3
- Push services
- Speech recognition and speech enabled services
- Digital Rights Management (with OMA)
- *continued...*



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Release 6

- EDCH (Enhanced uplink)
- AMR-WB+
 - AMR-WB extension for high audio quality
- Packet streaming (PSS)
- Generic User Profile
- Presence
- Charging management for WLAN, PoC etc
- etc



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Release 7

- o Currently planned features:
 - MIMO
 - 7.68 Mcps TDD
 - GERAN conversational services
 - Access Class Barring & Overload Protection
 - 3.84 Mcps TDD Enhanced Uplink
 - Advanced Global Navigation System
 - New spectrum, RAN improvements
 - Various enhancements
 - IMS, LCS, video and voice services
 - etc, etc...



Microsoft

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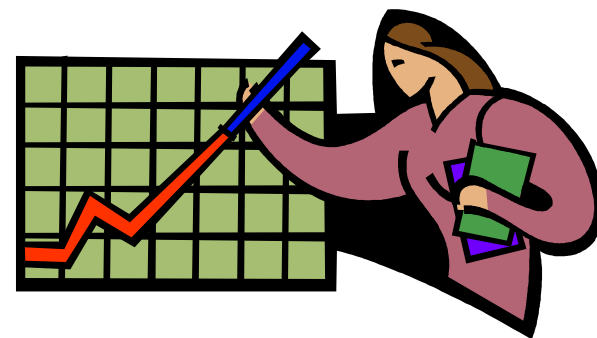
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3GPP Long Term Evolution (LTE) philosophy

- Current LTE focus is on enhancement of the Universal Terrestrial Radio Access (UTRA)
- With HSDPA and Enhanced Uplink, UTRA will remain highly competitive for several years
- LTE project aims to ensure the continued competitiveness of the 3GPP technologies for the longer term (10 years and beyond)
- Similar initiative underway for GERAN (GSM/EDGE radio access)



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Basic criteria for LTE

- Demand for higher data rates
- Expectations of additional 3G spectrum allocations
- Greater flexibility in frequency allocations
- Continued cost reduction

- Growing experience with the take-up of 3G is helping to clarify the likely requirements of users, operators and service providers in the longer term



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LTE targets

- Significantly increased peak data rates
- Increased cell edge bitrates
- Improved spectrum efficiency
- Improved latency
- Scalable bandwidth
- Reduced CAPEX and OPEX
- Acceptable system and terminal complexity, cost and power consumption
- Compatibility with earlier releases and with other systems
- Optimised for low mobile speed but supporting high mobile speed





Peak data rate

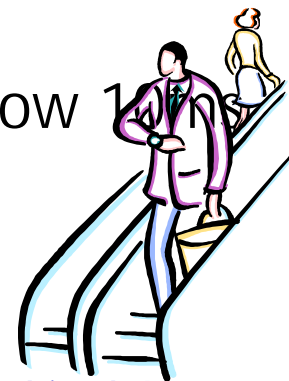
- Goal: significantly increased peak data rates, scaled linearly according to spectrum allocation
- Targets:
 - Instantaneous downlink peak data rate of 100Mbit/s in a 20MHz downlink spectrum (i.e. 5 bit/s/Hz)
 - Instantaneous uplink peak data rate of 50Mbit/s in a 20MHz uplink spectrum (i.e. 2.5 bit/s/Hz)





Latency

- o C-plane
 - Significant reductions in transition times from idle or dormant states to active state
 - C-plane capacity aiming for at least 200 active users per cell for 5MHz spectrum allocation, and at least 400 active users for higher allocations
- o U-plane
 - Radio access network latency below 10ms





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User throughput

- Downlink target:
 - 3-4 times that of Release 6 HSDPA
 - Scaled according to spectrum bandwidth

- Uplink target:
 - 2-3 times that of Release 6 Enhanced Uplink
 - Scaled according to spectrum bandwidth



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Spectrum efficiency

- Significantly improved spectrum efficiency and cell edge bitrate
 - Whilst maintaining same site locations
- Downlink target (bits/sec/Hz/site):
 - 3-4 times that of Release 6 HSDPA
- Uplink target (bits/sec/Hz/site):
 - 2-3 times that of Release 6 Enhanced Uplink



Mobility

- o The Enhanced UTRAN (E-UTRAN) will:
 - Be optimised for mobile speeds 0 to 15 km/h
 - Support, with high performance, speeds between 15 and 120 km/h
 - Maintain mobility at speeds between 120 and 350 km/h
 - And even up to 500 km/h depending on frequency band
 - Support voice and real-time services over entire speed range
 - With quality at least as good as UTRAN



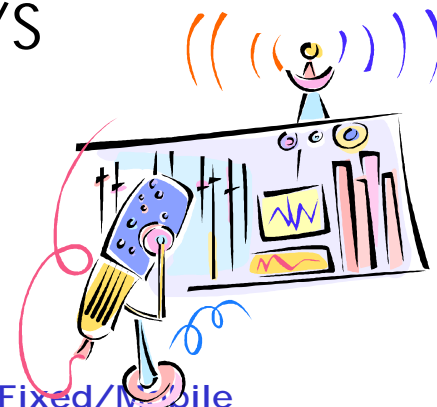
Coverage

- Cell ranges up to 5 km
 - With throughput, spectrum efficiency and mobility as defined above
- Cell ranges up to 30 km
 - Mobility as defined above; some degradation in throughput and spectrum efficiency permitted
- Cell ranges up to 100 km
 - Supported; degradations accepted





- Enhanced UTRA to support enhanced Multimedia Broadcast Multicast Service modes
 - Reuse of same physical layer components as for unicast, to reduce complexity/cost
 - Simultaneous, integrated and efficient voice and MBMS to the user
 - Support of MBMS in unpaired spectrum
 - Maximum throughput up to 1Mb/S





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Spectrum issues

- o Spectrum flexibility
 - E-UTRA to operate in 1.25, 2.5, 5, 10, 15 and 20 MHz allocations...
 - uplink and downlink...
 - paired and unpaired
- o Co-existence
 - With GERAN/3G on adjacent channels
 - With other operators on adjacent channels
 - With overlapping or adjacent spectrum at country borders
 - Handover with UTRAN and GERAN
 - Possibly not a mandatory requirement (to help reduce network and terminal complexity)



Cost considerations

- Optimisation of backhaul
- Maximised re-use of existing sites
- Maximise Multi-vendor interface
- Terminal complexity and power consumption to be optimised/minimised
- Avoidance of complicated architectures and unnecessary interfaces
- Efficient OAM&P (Operation, Administration, Maintenance and Provisioning)





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Timescales

- Initial studies and workplan creation to be completed by June 2006
- Aim at developing relevant standards by June 2007



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Progress to date

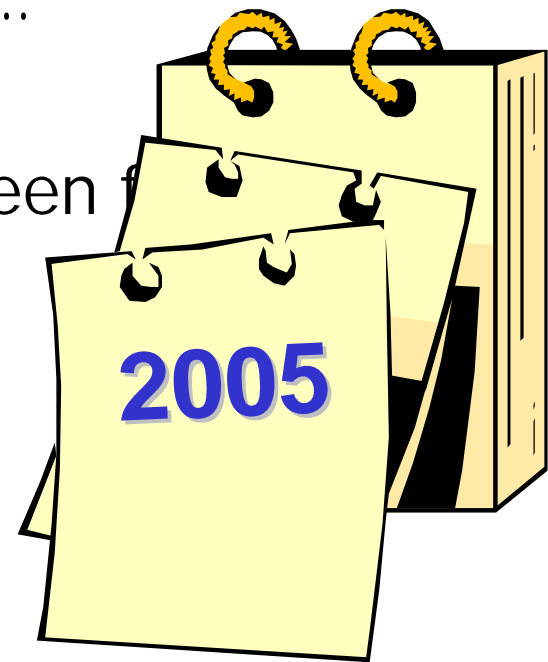
- Work is underway
- TR 25.913 on LTE requirements approved and under change control and work on Stage 2 is initiated
- Joint work has started with TSG SA WG2 (Architecture) on architecture issues
- Work also started in TSG RAN WG1 (Layer 1)
 - Current preference appears to be an OFDMA based downlink
 - For the uplink, SFDMA and OFDM both being considered
 - But also MC TD SCDMA and MC WCDMA are considered



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2005

- o Already 75 commercial UMTS networks ...
- o ... in 33 countries ...
- o ... serving 33 million subscribers ...
- o ... and many more launches foreseen this year



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What is ETSI TISPAN

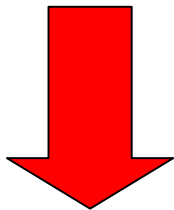
- TISPAN is an ETSI technical body, dealing with fixed networks and the migration from switched circuit networks to packet-based networks
- TISPAN is responsible for all aspects of standardisation for present and future converged networks including the NGN
- TISPAN deals with the service aspects, architectural aspects, protocol aspects, QoS studies, security related studies, mobility aspects within fixed networks, using existing and emerging technologies.



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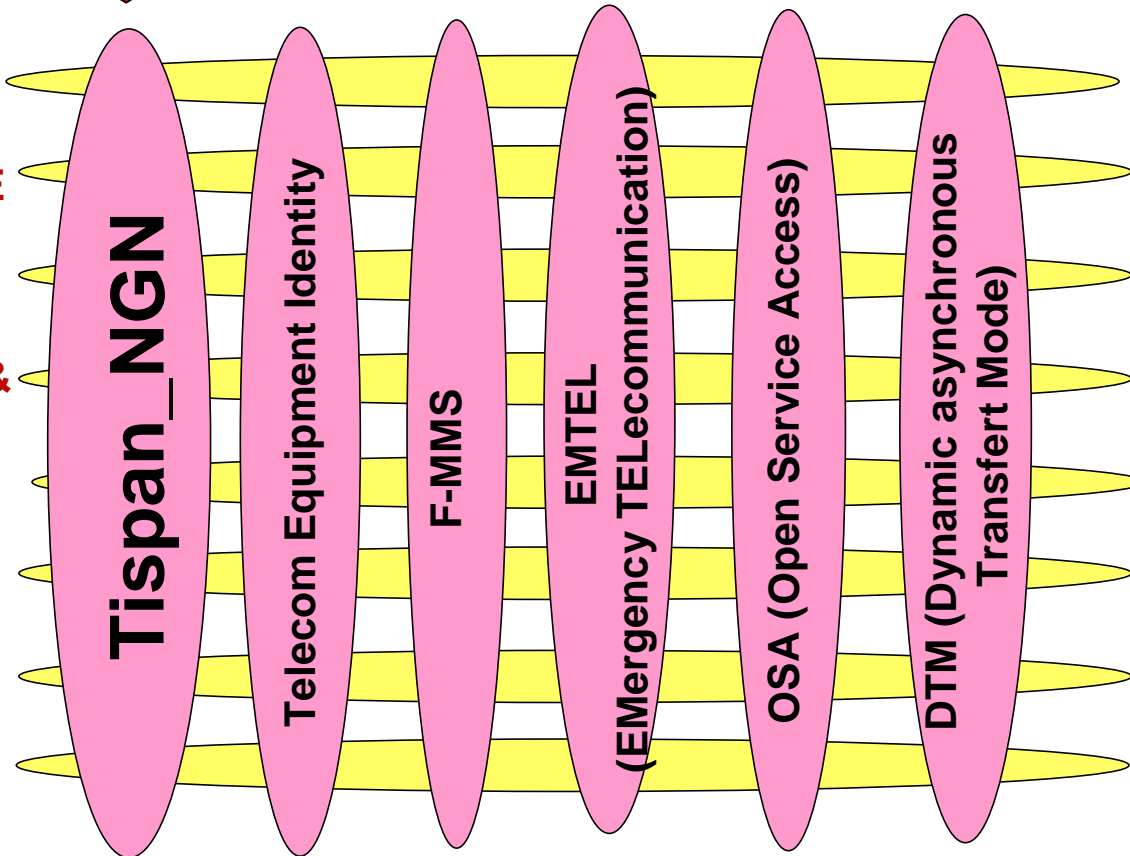
Technical Committee Structure

8 Working Groups



Projects

- SERVICES
- ARCHITECTURE
- PROTOCOLS
- NUMBERING & ROUTEING
- QoS
- TESTING
- SECURITY
- NETWORK MANAGEMENT



Etc... as needed

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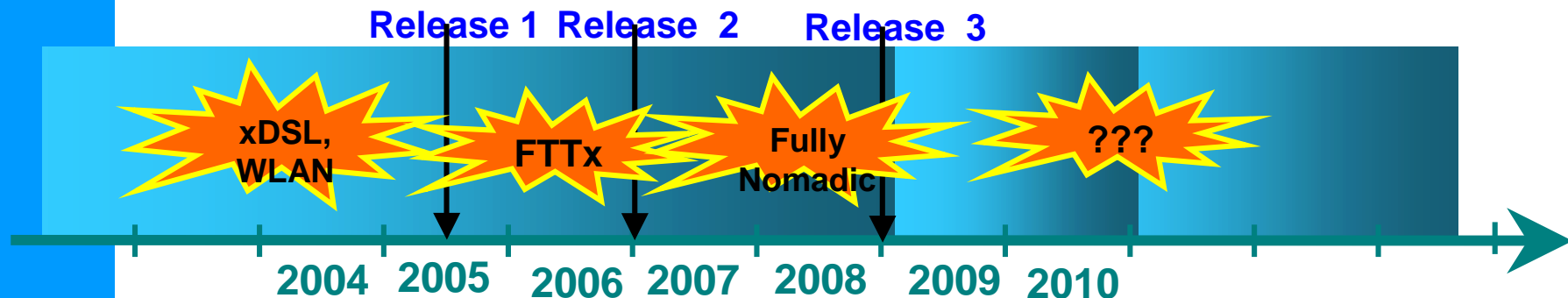
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NGN high level Roadmap

Towards a converged Wireline and Wireless NGN ...



- Release 1 bringing Multimedia services
 - Nomadicity/user-controlled roaming
 - xDSL access focus; Access Network Attachment Subsystem
- Release 2 optimizing access resources usage
 - According to user subscription profile and service use
 - Corporate users specific requirements ...
- Release 3 introducing full (inter-domain) Nomadicity
 - Inter-network domain nomadicity/user-controlled roaming
 - Higher bandwidth access (VDSL, FTTH, Wi-max ...)

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NGN Release 1 scope

- Ongoing discussion
 - Being consolidated meeting after meeting
 - Stabilized at TISPAN#4 (Sept.) & #4bis (Nov.) meetings
- Major service capabilities under consideration
 - Real time conversational services (Voice, Videotelephony)
 - Messaging (Instant Messaging, MMS), Presence Management
 - Legacy services emulation enabling legacy PSTN/ISDN migration towards NGN
 - Content delivery such as VOD, Video Streaming, TV-Channel distribution (if inputs and resources available)
- Network Architecture basis
 - ADSL access prime focus, possibly WLAN (may be deferred to Release 2)
 - 3G/UMTS IMS sub-system reused as basis for real-time Conversational services (SIP-based session control)



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NGN architecture design principles

- **A sub-system oriented approach, enabling:**
 - The addition of new subsystems over the time to cover new demands and service classes.
 - To import subsystems from other standardisation bodies.
 - Flexibility to adjust the architecture.
- **IP connectivity is provided using two subsystems:**
 - Network Attachment Subsystem (NASS)
 - Resource and Admission Control Subsystem (RACS)
- **First service-oriented subsystems include:**
 - The 3GPP IMS suitably adapted to accommodate xDSL-based access networks requirements (joint effort with 3GPP), supporting multimedia services and PSTN/ISDN Simulation.
 - A PSTN/ISDN Emulation subsystem specifically tailored to allow TDM equipment replacement, while keeping legacy terminals unchanged.



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NGN summary

- A strong industry demand
 - For new generation Multimedia services on xDSL access
 - For preparing replacement of soon becoming obsolescent PSTN
- For a first Release of specifications by end-2005
 - Giving main standards directions
 - With realistic and implementable solutions
- ETSI TISPAN taking the lead to propose an architecture basis consisting of a range of **subsystems**
 - Maximizing Wireline and Cellular convergence, through adoption of 3G/UMTS IMS component for support of conversational services
 - Access network attachment Subsystem, Resource and admission control sub-system ... preparing for next Releases

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NGN summary

- o TISPAN collaborating with 3GPP to accommodate Wireline access network requirements by IMS
 - A 1st Workshop held last June, 2nd held in April 2005
 - To coordinate the IMS specifications evolutions to support various Wireless and Wireline access technologies

- o Other collaborations very welcome
 - ITU-T NGN Focus Group, other SDOs
 - European IST projects e.g.  which is considering IMS in the scope of their system architecture too.

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Thank you for your attention

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