IPv6 for IP based Transport in UTRAN Architecture

Carolyn Taylor

Project Manager for UTRAN, 3GPP

Mobile Competence Centre

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

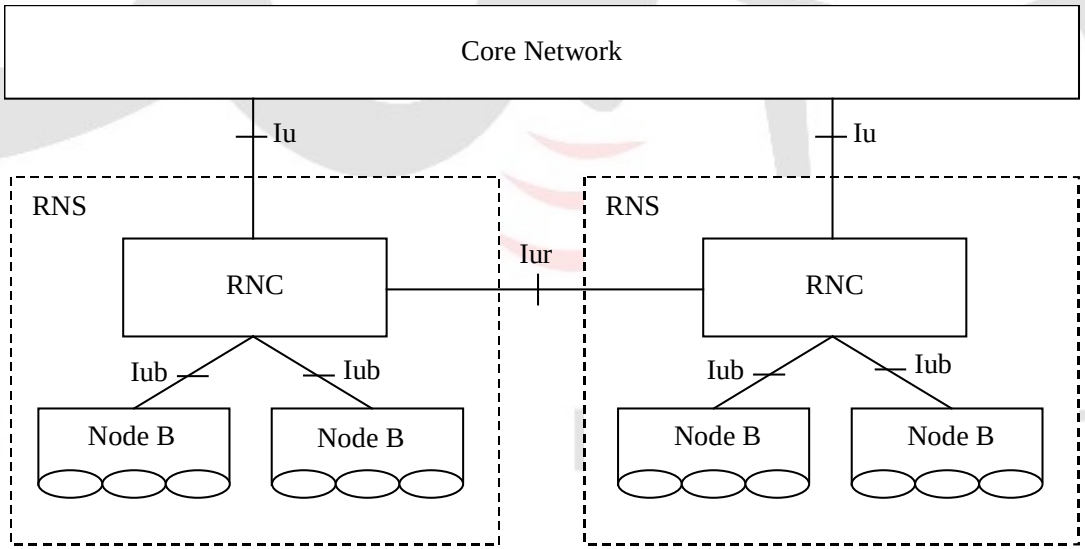
What is 3GPP ?

3GPP prepares Technical Specifications that:

- build on the success of the GSM Standard which currently serves 400 Million users in 161 countries
- include an innovative wideband CDMA radio interface known as the “Universal Terrestrial Radio Access (UTRA)” which employs Time Division Duplex (TDD) modes and a Frequency Division Duplex (FDD) mode. The TDD modes include the low chip rate mode proposed by CWTS.
- form the basis of IMT 2000 family members
- define the evolution of the GSM platform

What is UTRAN ?

- Universal Terrestrial Radio Access Network; UTRAN is a conceptual term identifying that part of the network which consists of RNCs and Node Bs between Iu an Uu interfaces.
  - A Node B is responsible for radio transmission / reception in one or more cells to/from the mobile equipment.
  - A RNC is in charge of controlling the use and the integrity of the radio resources, e.g. frequencies and power control.
- The UTRAN architecture is shown below.



Where is UTRAN work being done?

- Main Committee:
  - 3GPP TSG-Radio Access Network Working Group 3 (R3 for short….)
- Release 4 (March 2001) New Features :
  - New TDD mode (1.28 Mcps) for narrowband application
  - Evolution of UTRAN transport (mostly support of/for IP)
  - Various Radio Access Network improvements

Evolution of UTRAN transport feature

- The purpose of this new functionality is to enable the usage of IP technology for the transport of signalling and user data over Iu, Iur and Iub interfaces in the UTRAN.
- It's clear that there will be IP data traffic in the mobile networks.
- Some mobile operators require a UTRAN transport solution for IP as an alternative to ATM.
- It should be a matter of an operator's choice whether IP or ATM is used in the transport network to carry the various types of traffic from the circuit and packet domains.

Why IP based transport UTRAN ?

The foreseen benefits of IP is partly due to the following reasons:

- IP is developing to allow the support of a mix of traffic types and to support low speed links.
- The popularity of the Internet/World Wide Web and corporate LANs puts price pressure on IP networking equipment.
- IP is the technology to the “desktop” (terminals) so most applications will be based on IP.
- Operation and maintenance networks will be based on IP. To have networks with homogeneous technology can save management and operations costs.
- IP, like ATM, is a packet-switched technology and provides the opportunity to use transport resources in an efficient manner.
- Autoconfiguration capabilities.
- Dynamic update of routing tables.

Comparison between IPv4 and IPv6 for IP based transport in UTRAN

The UTRAN can be a very large network, with potentially thousands of end system hosts connected to a large routed network.

- In the table below there are some common and different features listed.

Feature	IPv4	IPv6
Address length	32 bit	128 bit
Address space	4294967296	3,40282366 e+38
Flow identification	No	Yes, 20 bit
Header size	20 byte	40 byte

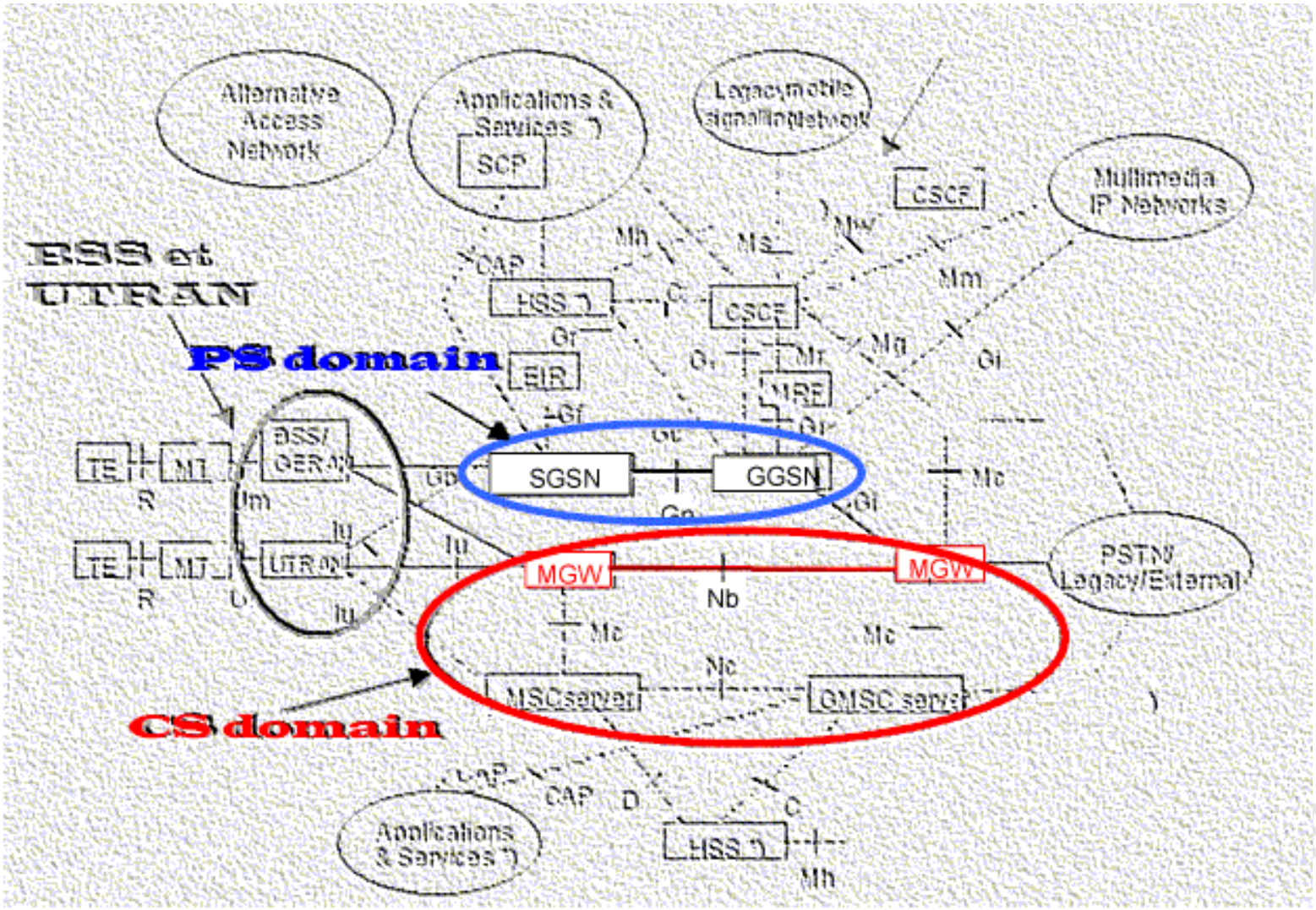
Why use IPv6 for transport in UTRAN ?

- There is potential for improved performance when IPv6 is used. This is due to the following:
  - Address Space: In an IP based UTRAN it is necessary that every UTRAN Node gets at least one IP address. Because of this reasons it is necessary to ensure that sufficient IP addresses are available.
  - Header Fields: IPv6 header fields are better aligned. This also facilitates implementation in hardware.
  - Header Size: Header compression can reduce the header size better than IPv4 under certain conditions.
  - IP Flow Identification: RAB's on the Iu interface and transport channels on the Iub/Iur interface need to be identified uniquely in their endpoints. Connection identification on the other UTRAN interfaces could be achieved by using the flow label filed of the IPv6 headers.

Why use IPv6 for transport in UTRAN ?

Future UTRAN architectures might evolve towards an end-to-end IP architecture, including the mobile equipments. This would require an even larger IP address space to be consumed by UTRAN networks. In order to create a future proved UTRAN it is advisable to use an IP version which can provide sufficient addresses, and this IPv6.

Use of IPv6 for transport in UTRAN



IP transport in UTRAN Schedule

Introducing the possibility to use IP as a transport mechanism is scheduled for March 2001. The final phase of work will consist of providing the necessary change requests to the existing specifications.

Spec No.	Subject	Approval for plenary#
TS 25.401	UTRAN Overall Description	RAN #11
TS 25.402	Synchronisation in UTRAN, Stage 2	RAN #11
TS 25.410	UTRAN Iu Interface: General Aspects and Principles	RAN #11
TS 25.411	UTRAN Iu Interface Layer 1	RAN #11
TS 25.412	UTRAN Iu interface signalling transport	RAN #11
TS 25.413	UTRAN Iu Interface RANAP Signalling	RAN #11
TS 25.414	UTRAN Iu interface data transport & transport signalling	RAN #11
TS 25.415	UTRAN Iu interface user plane protocols	RAN #11
TS 25.420	UTRAN Iur Interface: General Aspects and Principles	RAN #11
TS 25.422	UTRAN Iur interface signalling transport	RAN #11
TS 25.423	UTRAN Iur Interface RNSAP Signalling	RAN #11
TS 25.424	UTRAN Iur interface data transport & transport signalling for CCH data streams	RAN #11
TS 25.425	UTRAN Iur interface user plane protocols for CCH data streams	RAN #11
TS 25.426	UTRAN I_{ur} and I_{ub} Interface Data Transport & Transport Signalling for DCH Data Streams	RAN #11
TS 25.430	UTRAN I_{ub} Interface General Aspects and Principles	RAN #11
TS 25.432	UTRAN Iub interface signalling transport	RAN #11
TS 25.433	UTRAN Iub Interface NBAP Signalling	RAN #11
TS 25.434	UTRAN Iub interface data transport & transport signalling for CCH data streams	RAN #11
TS 25.435	UTRAN Iub interface user plane protocols for CCH data streams	RAN #11
TS 25.442	UTRAN Implementation Specific O&M Transport	RAN #11