Requirements for All-IP
The View of a "Legacy Network" Operator

Matthias Edelmann, Martin Guntermann,
Volker Höhn, Armin Toepfer
Mannesmann Mobilfunk

Subjects

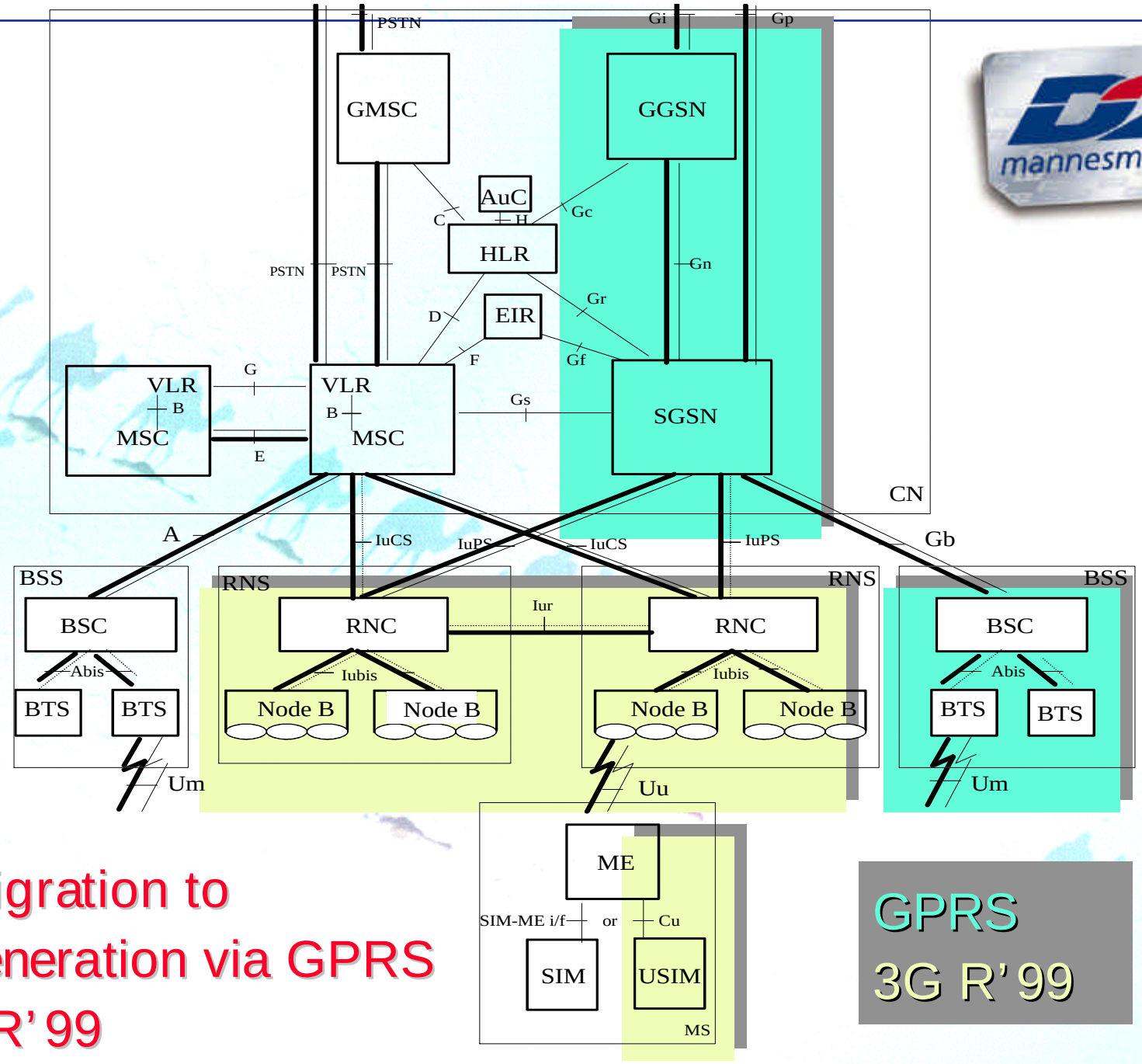
- *Mannesmann Mobilfunk -*
  A “ Legacy Network Operator”
- *How Should the Roadmap Look Like?*
- *Key Questions for Mannesmann Mobilfunk*
  - *Service*
  - *System*
  - *Security*
  - *Radio*

Subjects

- *Mannesmann Mobilfunk -*
  A “ Legacy Network Operator”
- *How Should the Roadmap Look Like?*
- *Key Questions for Mannesmann Mobilfunk*
  - *Service*
  - *System*
  - *Security*
  - *Radio*

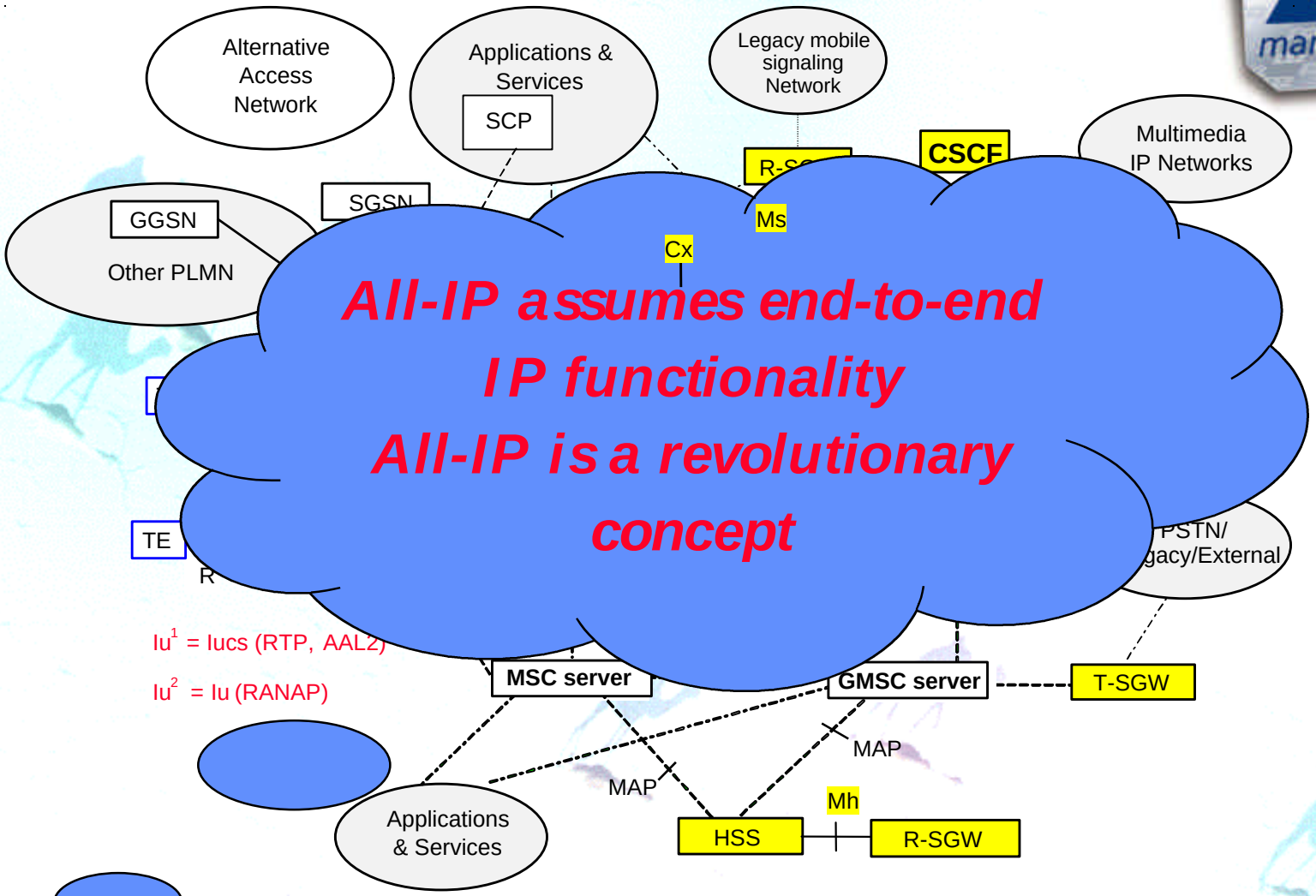
How does our network look like ?

- Mannesmann Mobilfunk has nearly 10 Million customers
- Our customers generate more than 350 Million SMS/month
- We operate an installed basis of about 100 MSCs and 20.000 radio cells
- We frequently add MSCs, SMSCs, IN-Systems, VoiceMail Systems, Voice Response Units.....
- We stick to multi-vendor capability

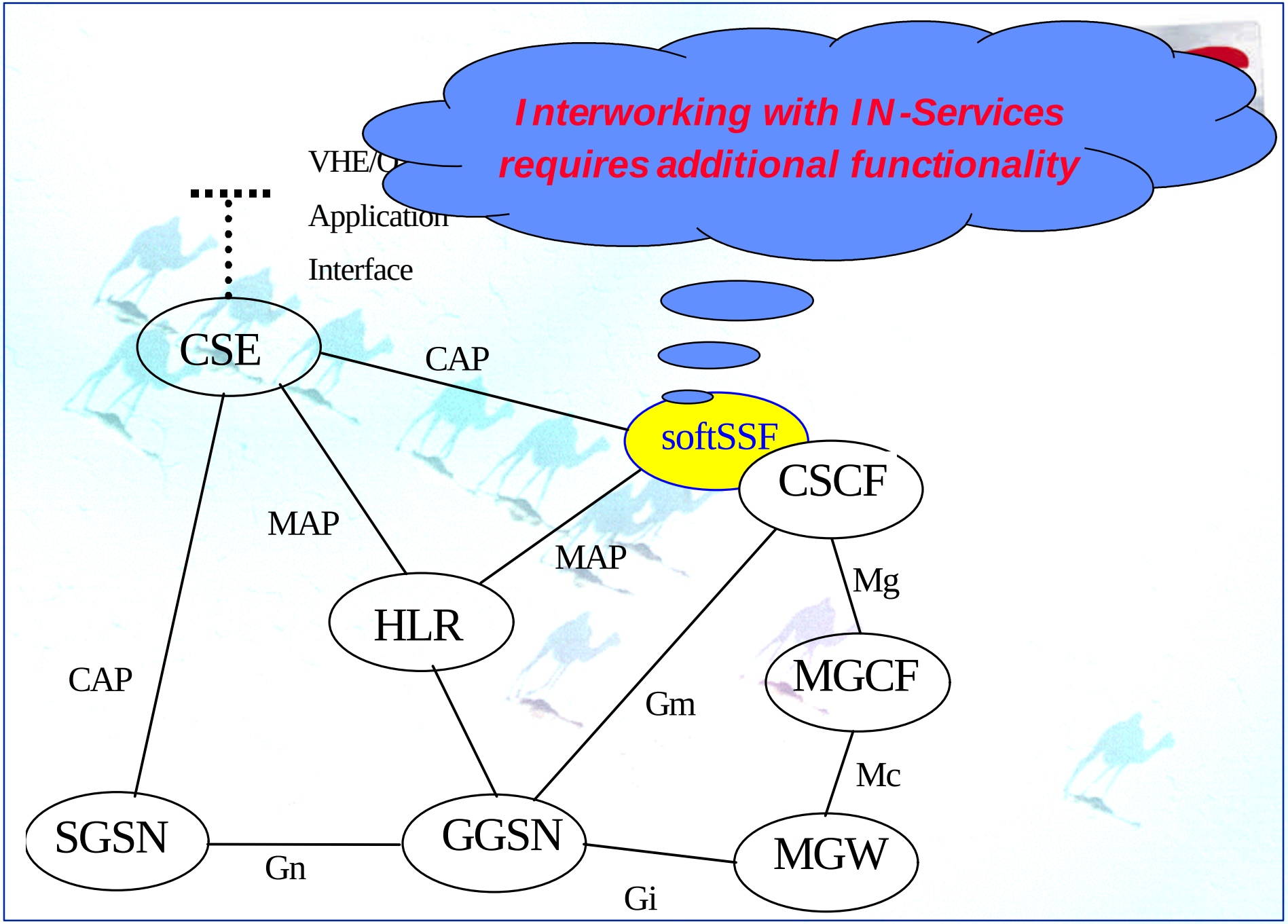


The migration to 3rd Generation via GPRS to 3G R'99

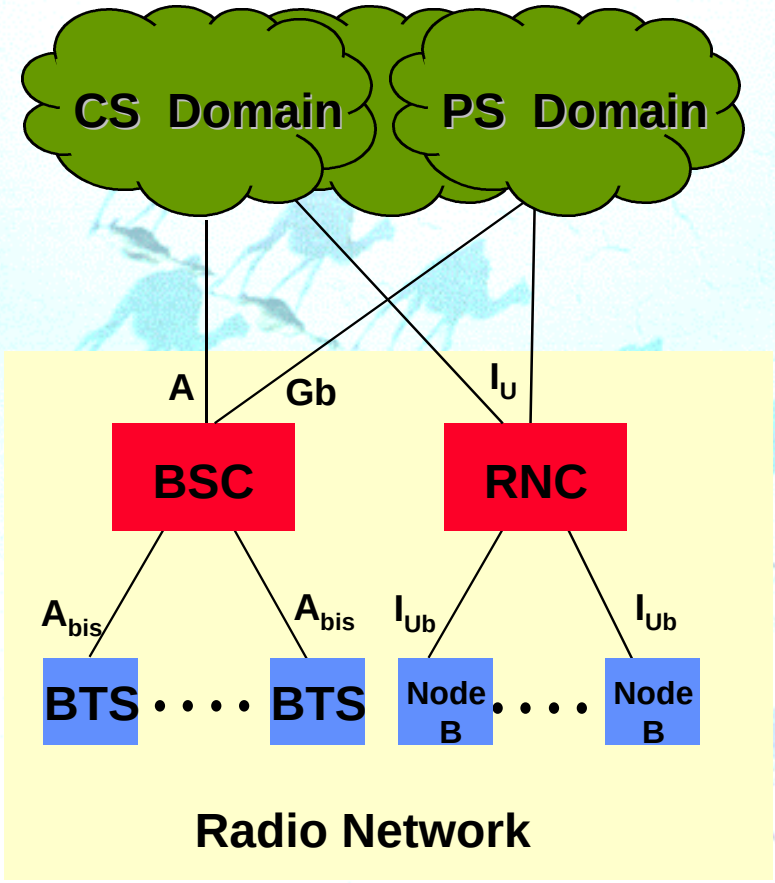
GPRS
3G R'99

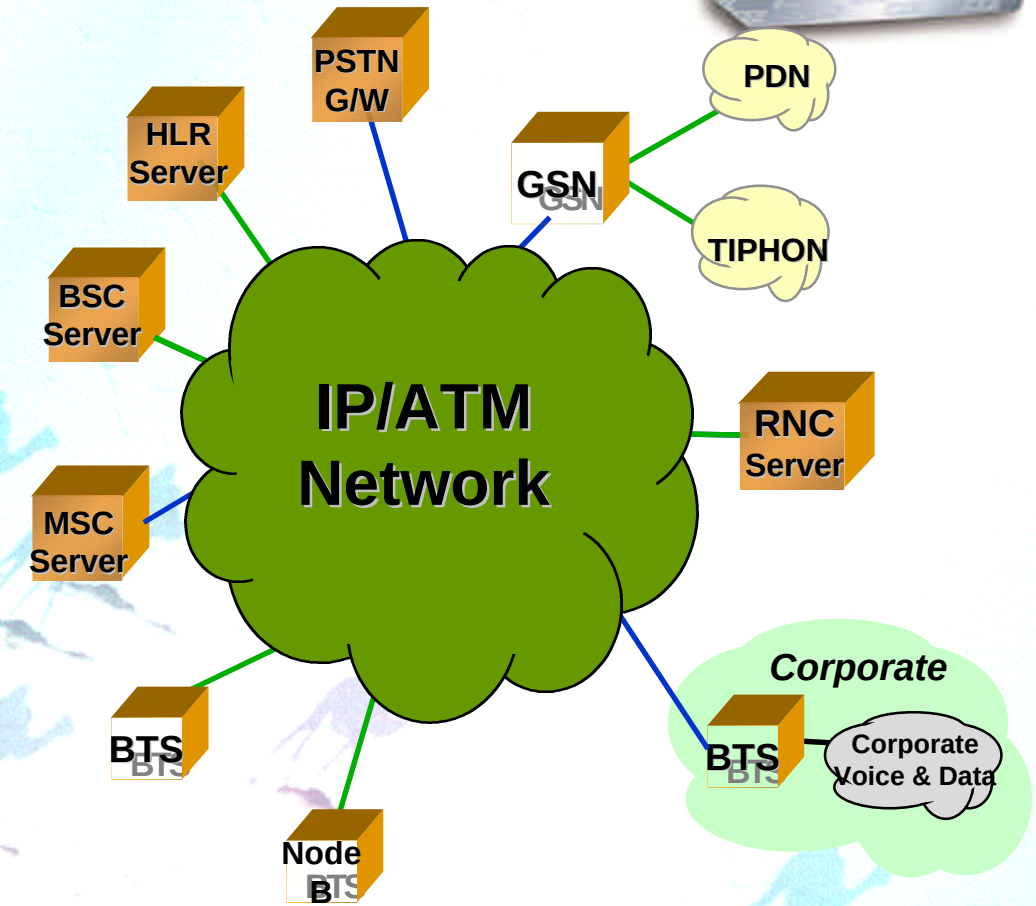


New entities/interfaces -> All-IP simplifies??


Interworking with IN-Services
requires additional functionality
VHE/O
Application
Interface
CSE
CAP
softSSF
CSCF
MAP
MAP
Mg
HLR
CAP
MGCF
Gm
Mc
SGSN
GGSN
MGW
Gn
Gi

Simplified "All-IP" - our Goal





Hierarchical Network based on R'99

IP over ATM Release 2000++

Some General Issues

☞ Among other reasons, GSM has been a success because it is easily deployed due to off-the-shelf technology

The All-IP concept

☹ multiplies the number of functional entities and protocols

☹ 23.922* makes reference to bunches of protocol options

☹ 23.922* makes reference to ITU protocols in progress

☹ 23.922* assumes modifications of ITU protocols (ISUP) which are even not considered

☹ makes interaction between 2nd and 3rd G services complex

☹ the concept does not address billing aspects

☹ radio issues are far from resolution

* Feasibility Study of SA2

Benefits vs. Constraints [TR23.922]

☞ *Ability to offer seamless services, through the use of IP, regardless of means of access*	*OK*
☞ *Synergy with generic IP developments and reduced cost of service*	*cost of service??*
☞ *Efficient solution for simultaneous MM services including voice, data, and advanced real time services.*	*possible,voice??*
☞ *Higher level of control of services*	*many open issues*
☞ *Integrated& cost reduced O&M through IP*	*??? More NE's*
☞ *Take advantage of Internet applications by supporting terminals which are IP clients.*	*OK*
☞ *Cost reduction through packet transport*	*verification?*

Subjects

- *Mannesmann Mobilfunk -*
  A “ Legacy Network Operator”
- *How Should the Roadmap Look Like?*
- *Key Questions for Mannesmann Mobilfunk*
  - *Service*
  - *System*
  - *Security*
  - *Radio*

What is the Impact to the Road Map

- ☞ We support the overall goal of the All-IP concept
- ☞ We stress the anticipated benefits as "Must"
- ☞ The architectural considerations are full of "may's" and "if's" and "ffs" - it is far from maturity
- ☞ We suppose that current concept papers does not provide sufficient guideline for straight forward specification
- ☞ We assume that All-IP cannot completed within the anticipated time frame of one year

What ... And Our Recommendation

- We propose to devote the year 2000 for completion of the ground work
  - system performance and complexity analysis, QoS solutions, billing concepts, identification of protocols (less options), availability and stability of third party protocols,

in order to carry out the detailed specification work in 2001

We anticipate a first set of stable and mature set of All-IP specifications end of 2001 - with the quality we are used to, with few as possible choices and options

The Roadmap (2001- 2003)

☞ We propose

Step 1: To complete the first set of specifications for 2001. This should comprise Core Network specifications, including all interworking/gateway function

Step 2: Then Access Network between RNC/BSC and NodeB/BTS

Step 3: Then Radio Interface - equals the "All-IP" end-to-end solution

Subjects

- *Mannesmann Mobilfunk -*
  A “ Legacy Network Operator”
- *How Should the Roadmap Look Like?*
- *Key Questions for Mannesmann Mobilfunk*
  - *Service*
  - *System*
  - *Security*
  - *Radio*

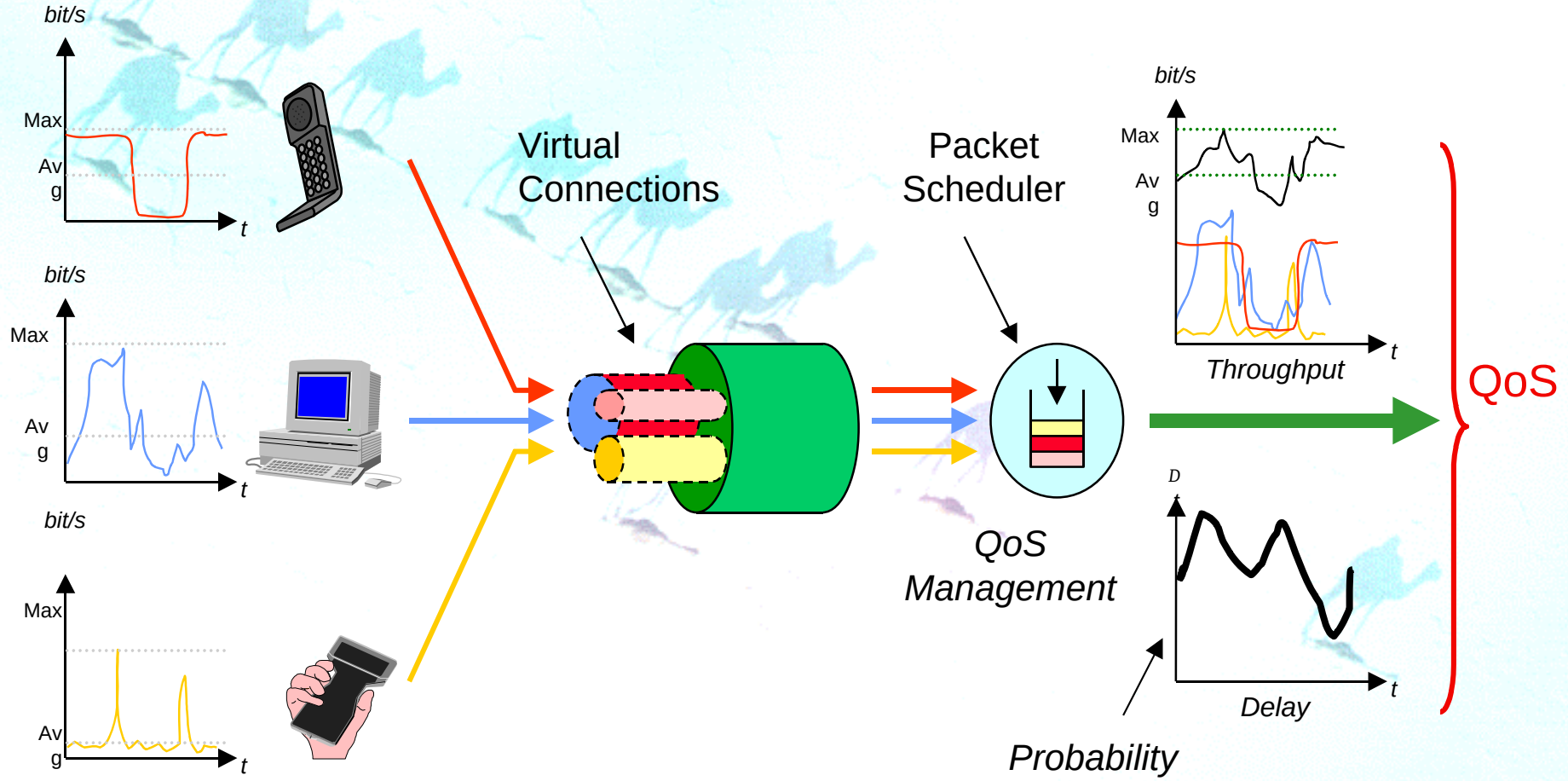
Key Questions to be Addressed

In general we should address the following areas:

Quality of Service
Efficiency
Capacity
Performance
Complexity
Scalability
Security
Operability
Reliability
Accountability (Billing)
Migration
Roll-Out

But we concentrate on some questions

Is there really a Gain for Packet Traffic with Service Mix with real-time services



System Requirements I

- GPRS and Release99 are introducing additional Network Elements to be managed. Release 00 should decrease the number of Network Elements !!
- Limit the number of Options: only CS/PS or All-IP
- Compatibility to GSM (GSM UMTS Handover)
- Less Interworking/Gateway Functions
- Support of the Multi-Vendor Environment is a must
- Integration of IN Service Concepts (CAMEL)
- Testability (easy to test)
- Scalability (Performance, Address Space for Services and NE's)

System Requirements II

- Support of 2nd Generation GSM Radio Access Network
- Support of Self Configuration and Capacity Planning
- Common O& M (IP **and** switched world)
- Interception
- Ability to Integrate with Billing System
- Support of all current TMN requirements:
  - Configuration Management
  - Fault Management
  - Performance Management
  - Security Management

Service Requirements

- Service Continuity of “Legacy Services”
- Support of new Multi-Media Services as simultaneous Voice and Video application

Security Requirements

- Working Assumption: IMSI Security is available via R'99
- Protecting MAP-messages:
  Confidentiality
  Integrity
  Authentication
- Key Management
- Which layer of implementation (e.g. IP or MAP)?
- Firewall management

Radio Requirements I

- Optimised Radio Resource Usage for service and signalling support
- Continuation of R'99 concepts:
  Radio related issues (HO etc.) - be handled in the Radio Access Network (RAN)
  Separation of User plane and Control plane Protocol stacks in the RAN
- Fast uplink access and fast resource assignment in both Up- and Downlink
- Optimisation of end to end IP transport for real time services (e.g. header compression etc.)

Radio Requirements II

- Bearer differentiation capability at the RAN for multiplexing different types of traffic on the air
- Optimisation of coding and interleaving for real time services
- Support of multiple data flows with different QoS per IP address
- Spectrum efficiency shall be maximised, e.g. by statistical multiplexing
- Network controlled Handover- HO UMTS-GSM

Make "All-IP" a Success !

Thank You For Your Attention!