

Why we need a single SIP <--> ISUP Release Cause mapping

presented by

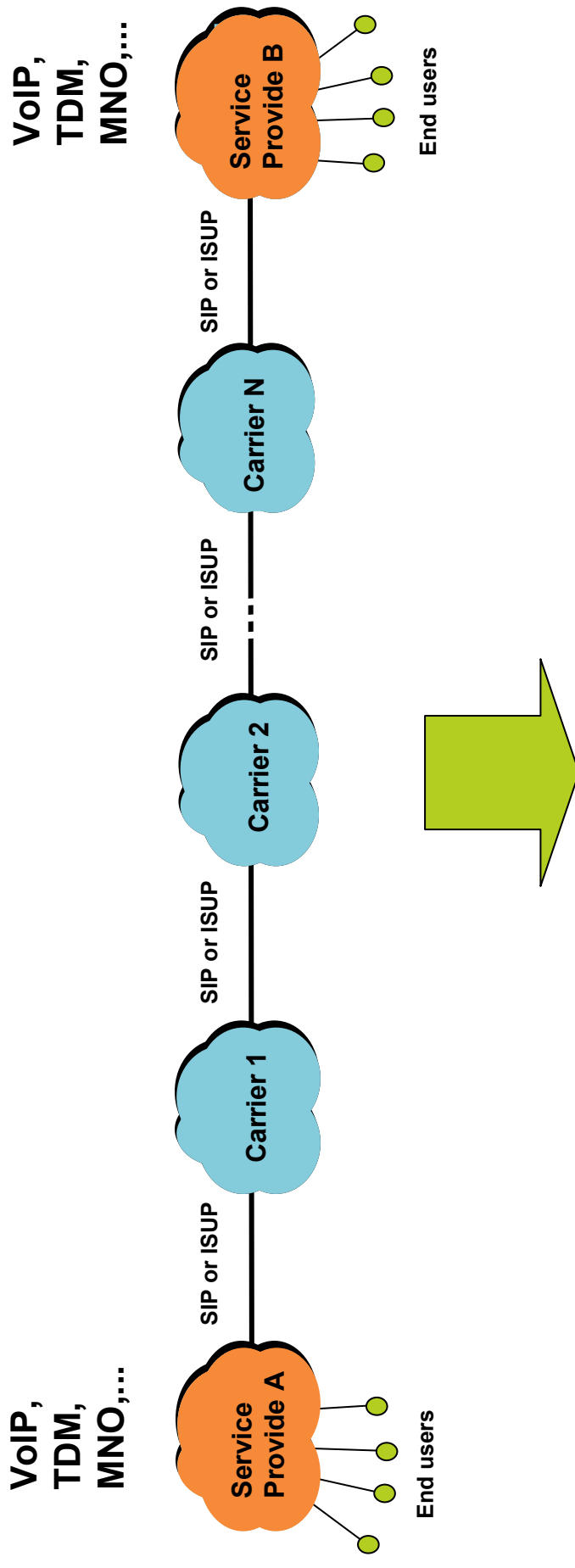
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Ericsson
3GPP CT3 Chairman

May 26, 2011

Agenda

- Why is an unambiguous SIP ↔ ISUP mapping important?
- Why cooperation with 3GPP Working Group CT3 on mapping?
- Summary of achieved results
- Other potential areas of future cooperation

Basic reference architecture



Potentially many protocol mappings in the end-to-end path

Possible implications of incorrect mapping

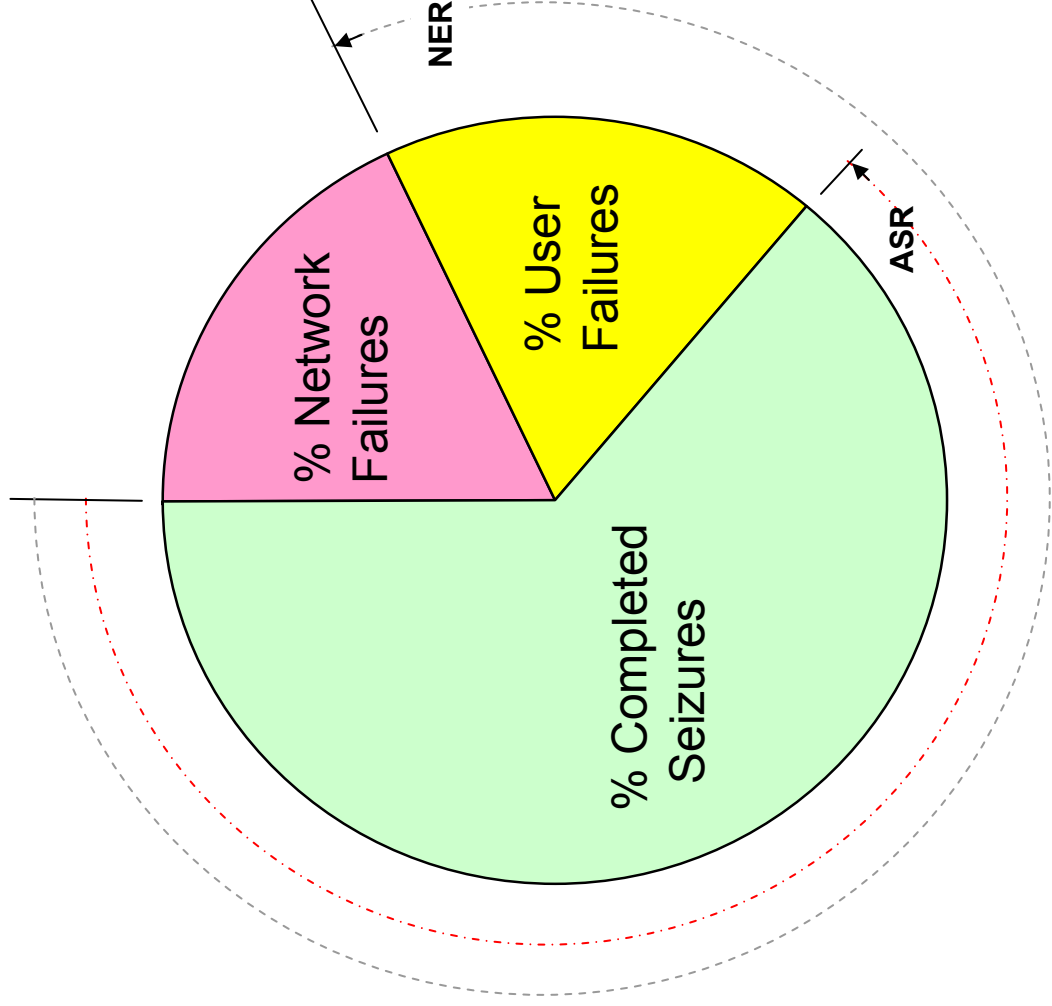
- **Incorrect call handling**
 - E.g. CV 34 (Lack of network resources) → Re-routing, while CV 17 (User busy) → No re-routing
- **Accounting inaccuracies due to incorrect disconnect cause values stored in CDRs**
- **Improper operational handling of SLAs between carriers/operators**
 - KPI statistics based on CV reporting may give wrong values e.g. for NER, ASR
- **Inefficient O&M, trouble shooting:**
 - Trying to fix the "wrong" problem
 - Dialogue between operators/carriers
 - Dialogue with vendors

Disconnect Cause Value Mapping

Desired Behaviour (i3 Forum)

- **Mapping Granularity:**
 - A Response Code or Cause Value (CV) should be used in only one mapping
- **Mapping Stability:**
 - When the mapping gives the same results regardless of how many further conversions take place
- **Symmetric Mapping:**
 - A one-to-one mapping in both directions that is inherently stable, e.g.:
 - CV 24 → SIP Response 433 → CV 24
 - SIP Response 433 → CV 24 → SIP Response 433
- **QoS/KPI preservation:**
 - Avoid mapping from "User Class" event to "Network Class" event and v.v.

Network Effectiveness Ratio (NER)



- NER is the ability of networks to deliver calls to the far-end terminal.
- NER = the relationship between the number of seizures and the sum of the number of seizures resulting in either an
 - answer message, or
 - a user busy, or
 - a ring no answer, or
 - terminal rejection/unavailability.
- Unlike ASR, NER excludes the effects of customer behaviour and terminal behaviour.

Three approaches for interworking with ISUP

- SIP Reason Header (RFC 3326)
 - + Can include ISUP cause values
 - SIP servers/clients are free to ignore this header field
 - Has no impact on protocol processing (e.g. Re-routing)
 - Location field info is lost (e.g. Network/User info for NER calculations)
- SIP-I in the carrier network
 - + ISUP info is preserved by encapsulation
 - If several chained carriers, then interworking with other interconnect types may cause inconsistencies, e.g. if mapping to native SIP (cf. IMS) is eventually required.
- Direct mapping: SIP Status Codes ↔ ISUP Cause Values

Available Mapping Standards

 ITU-T Q.1912.5

 3GPP TS 29.163 "Interworking Between IP Multimedia Networks and Circuit Switched Networks"

 IETF RFC 3398

Example of inconsistencies:

RFC 3388 :

ISUP 2 "No route to network" → SIP 500 "Server internal error" → ISUP 1 "Unallocated/unassigned number"

Q.1912.5:

ISUP 2 "No route to network" → SIP 500 "Server internal error" → ISUP 127 "Interworking unspecified"



In neither case the original cause value is preserved



- No mapping is perfect, select the most suitable standard
- Use the same standard in all the interconnected networks

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About 3GPP



- 3rd Generation Partnership Project
- 3GPP is a collaborative activity between the following standards development organizations (Operational Partners, OPs):

 (JAPAN)	 (USA)	 (CHINA)
 World Class Standards (EUROPE)	 (JAPAN)	 (KOREA)

- 376 Individual member companies have joined the partnership via the OPs.



About 3GPP

Scope of work



- Created in 1998 with the scope to specify a 3G Mobile System
- Subsequently took over responsibility for GSM (2G) specifications
- LTE & EPC high-speed Mobile Systems
- "Common IMS" (input from ETSI TISPAN (fixed netw.), 3GPP2,)
- Fixed/mobile interworking/convergence
- etc.

About 3GPP

Market Representation Partners

-  IMS Forum
-  TD-Forum
-  GSA
-  GSM Association
-  IPV6 Forum
-  UMTS Forum
-  4G Americas
-  TD SCDMA Industry Alliance
-  InfoCommunication Union
-  Femto Forum
-  CDMA Development Group
-  Cellular Operators Association of India (COAI)
-  NGMN Alliance



About 3GPP

Some ways of working



- 17 Working groups, typically 4-7 meetings per year
 - GERANx WGs (GSM EDGE Radio Access Networks)
 - RANx WGs (Radio Access Networks)
 - SAx WGs (Service & Systems Aspects)
 - CTx WGs (Core Network & Terminals), e.g. **CT3** : Interworking, policy control
- Working by consensus
- New Releases every 1 - 1.5 years
- Active maintenance of old, "frozen" releases via Change Requests → "Living specifications"

And, note that

**Many of the i3 Forum members
are
also members of 3GPP !**

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3GPP – i3Forum

SIP Status Code ← → ISUP Cause Value Mapping

- Mapping agreed for 3GPP TS 29.163 for Rel-7 with mirrored changes agreed also for Rel-8, Rel-9 and Rel-10. Available in versions equal to or higher than:
 - v 7.22.x (for Rel-7)
 - v 8.14.x (for Rel-8)
 - v 9.5.x (for Rel-9)
 - v 10.1.x (for Rel-10)
- **Agreed Change Requests can be found here:**
 - http://www.3gpp.org/ftp/tsg_ct/WG3_interworking_ex-CN3/TSGC3_61_Ljubljana/Docs/
 - http://www.3gpp.org/ftp/tsg_ct/WG3_interworking_ex-CN3/TSGC3_62_Salt%20Lake%20City/Docs/
- **All versions of 3GPP TS 29.163 can be found here:**
 - <http://www.3gpp.org/ftp/Specs/html-info/29163.htm>

i3F / 3GPP Agreed Changes

3GPP TS 29.163

3GPP Doc. Numbers (Rel-7/8/9/10)	Title	Source Companies
C3-110258 C3-110259 C3-110260 C3-110261	New Cause Code mappings of CV 23,38- 47 and 65-79	Deutsche Telekom, ATT, Telecom Italia
C3-110262 C3-110263 C3-110264 C3-110265	Change of Cause code mapping	Deutsche Telekom, ATT, Telecom Italia
C3-110266 C3-110267 C3-110268 C3-110269	Mapping of ISUP Cause Value 88 to Response 606 and vice versa	Deutsche Telekom, ATT, Telecom Italia
C3-110402 C3-110670 C3-110671 C3-110672	Mapping of SIP Response 604 to ISUP Cause Value 2	Deutsche Telekom, ATT, Telecom Italia

Agreed Changes: Interworking from ISUP to SIP (Part 1)

Receipt of REL message

REL Message, Cause Indicators parameter →	SIP Message, Status Code
Cause value No 2 (No route to specified transit network)	604 Does not exist anywhere
Cause value No 3 (No route to destination)	604 Does not exist anywhere
Cause value No 21 (Call rejected)	603 Decline IF location field is set to user ELSE 403 Forbidden
Cause value No 23 (Redirection to new destination)	410 Gone
Cause value No 29 (Facility rejected)	501 (Not Implemented)
Cause value No 38 (Network out of order)	500 Server Internal error
Cause value No 41 (Temporary failure)	503 Service Unavailable
Cause value No 42 (Switching equipment congestion)	503 Service Unavailable
Cause value No 43 (Access information discarded)	500 Server Internal error
Cause value No 44 (Requested channel not available)	503 Service Unavailable
Cause value No 46 (Precedence call blocked)	500 Server Internal error
Cause value No 47 (Resource unavailable, unspecified) (class default)	503 Service Unavailable

Agreed Changes: Interworking from ISUP to SIP (Part 2)

Receipt of REL message

REL Message, Cause Indicators parameter	SIP Message, Status Code
Cause value No 50 (Requested facility not subscribed)	488 Not acceptable here
Cause value No 57 (Bearer capability not authorised)	603 Decline
Cause value No 58 (Bearer capability not presently available)	503 Service Unavailable
Cause value No 63 (Service option not available, unspecified) (class default)	501 (Not Implemented)
Cause value No 65 (Bearer capability not implemented)	500 Server Internal error
Cause value No 69 (Requested facility not implemented)	501 Not Implemented
Cause value No 70 (Only restricted digital information capability is available)	501 Not Implemented
Cause value No 79 (Service or option not implemented, unspecified) (class default)	501 Not Implemented
Cause value No 88 (Incompatible destination)	606 Not Acceptable
Cause value No 98 (Message not compatible with call state or message type non-existent or not implemented)	501 Not Implemented
Cause value No 103 (Parameter non-existent or not implemented, passed on)	501 Not Implemented
Cause value No 111 (Protocol error, unspecified) (class default)	400 Bad Request

Agreed Changes: SIP to ISUP mapping

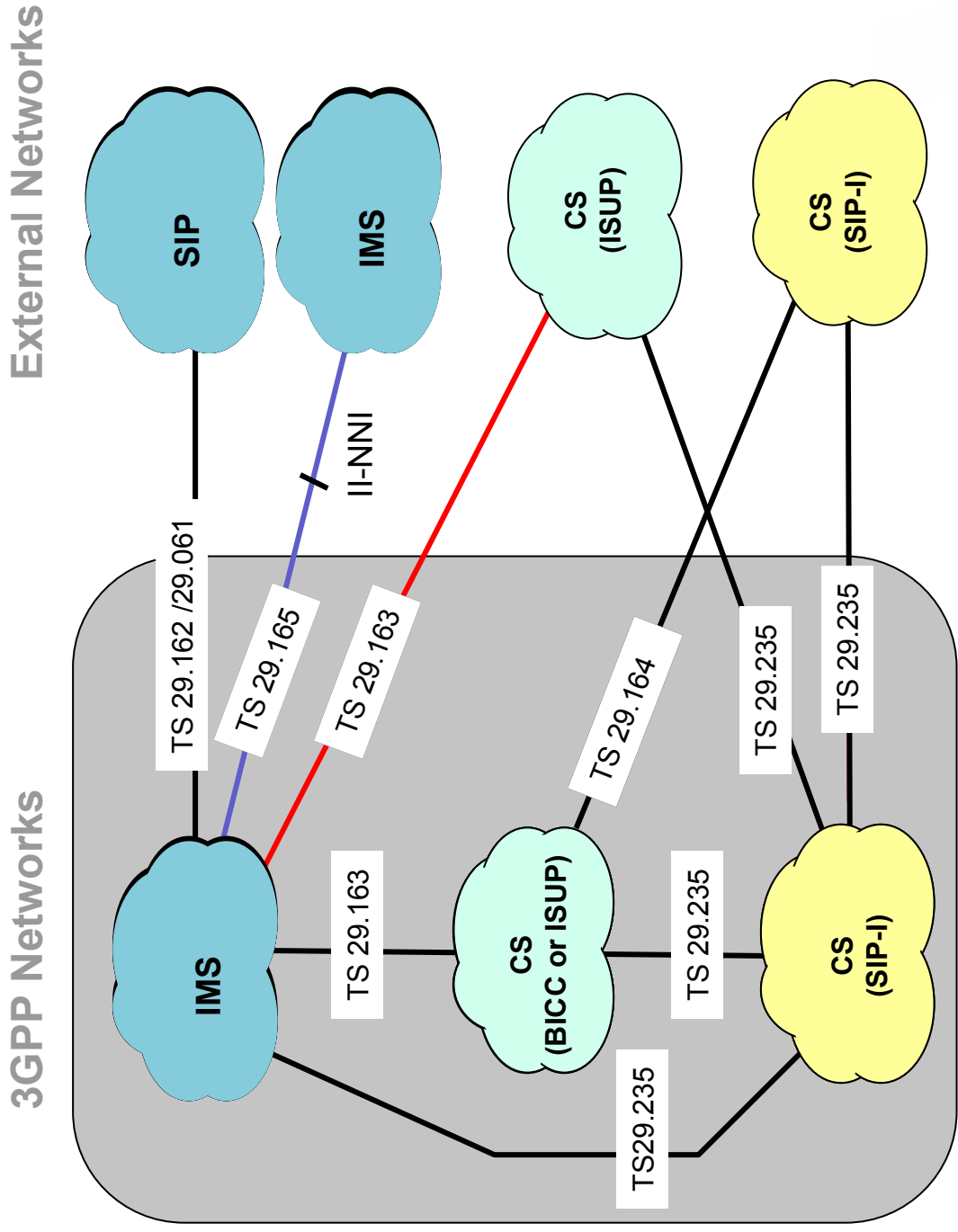
Receipt of SIP Status Codes 4xx, 5xx, 6xx

4xx/5xx/6xx SIP Message →	REL Message (cause value)
400 Bad Request	Cause value No 111 (Protocol error, unspecified)
403 Forbidden	Cause value No 79 (Service or option not implemented, unspecified)
408 Request Timeout	Cause value No 102 (Recovery on timer expiry)
414 Request-URI too long	Cause value No 111 (Protocol error, unspecified)
416 Unsupported URI scheme	Cause value No 111 (Protocol error, unspecified)
420 Bad Extension	Cause value No 111 (Protocol error, unspecified)
421 Extension required	Cause value No 111 (Protocol error, unspecified)
488 Not acceptable here	Cause value No 50 (Requested facility not subscribed)
501 Not implemented	Cause value No 79 (Service or option not implemented, unspecified)
502 Bad Gateway	Cause value No 27 (Destination out of order)
604 Does not exist anywhere	Cause value No 2 (No route to specified transit network)
606 Not Acceptable	Cause value No 88 (Incompatible destination)

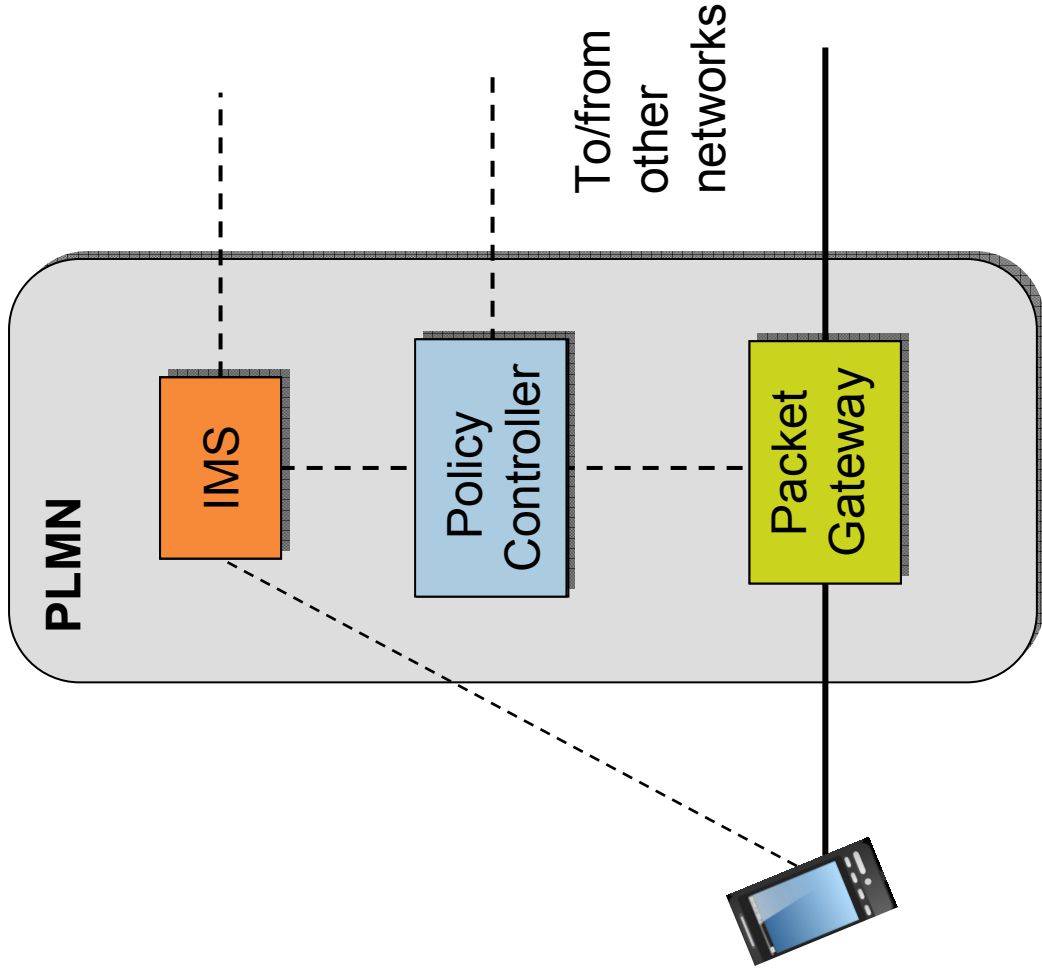
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Some interworking scenarios covered by CT3












Policy Control (QoS, Charging)



Policy controller can store policy rules for the local network in the gateway per user session:

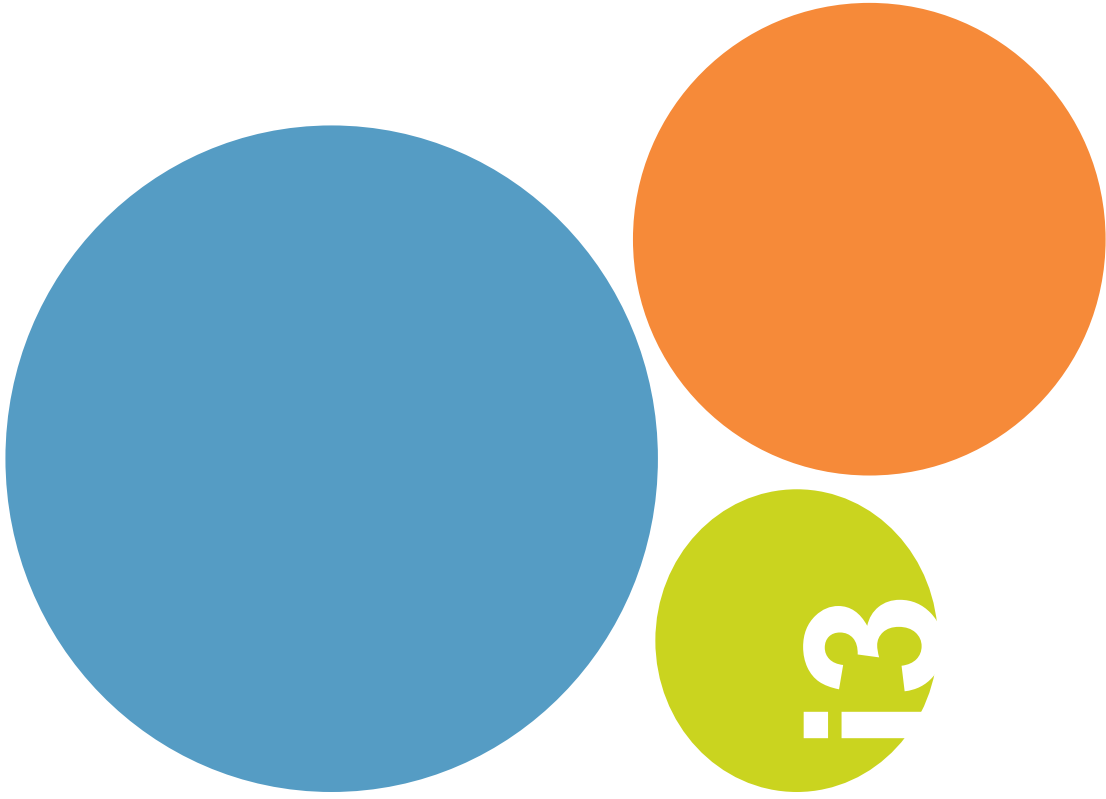
- QoS (QoS Class Identifier, bandwidth, allocation/retention priorities,...)
- Special charging per application
- Gold/silver/bronze subscriptions
- Blocking of unallowed traffic
- Monthly subscription plans etc.

Other areas of common interest ?

-  **Optimal Media Routing (IMS)**
 -  Removing nodes from the end-to-end media path
 -  Allowing flexible business models
 -  Se 3GPP TS 29.079
-  **IP Interconnection of Services**
 -  Carrier-grade e2e performance between users connected to different networks
 -  Ref. e.g IPX work in GSMA
 -  Ongoing work on service requirements and architecture in 3GPP groups SA1 and SA2
-  **High-Definition Video Conferencing / Telepresence, (IMS-based) ?**

Further contact with 3GPP

- If your company is a 3GPP member, just talk to your colleague being a 3GPP delegate
- Browse the web: www.3gpp.org
- All 3GPP specifications, meeting documents, work plans, etc can be downloaded from the web
- Feel free to contact the Chairman of the relevant Working Group 😊



Thank You!

www.i3forum.org