A Common Numbering Infrastructure for IN and IP Telephony

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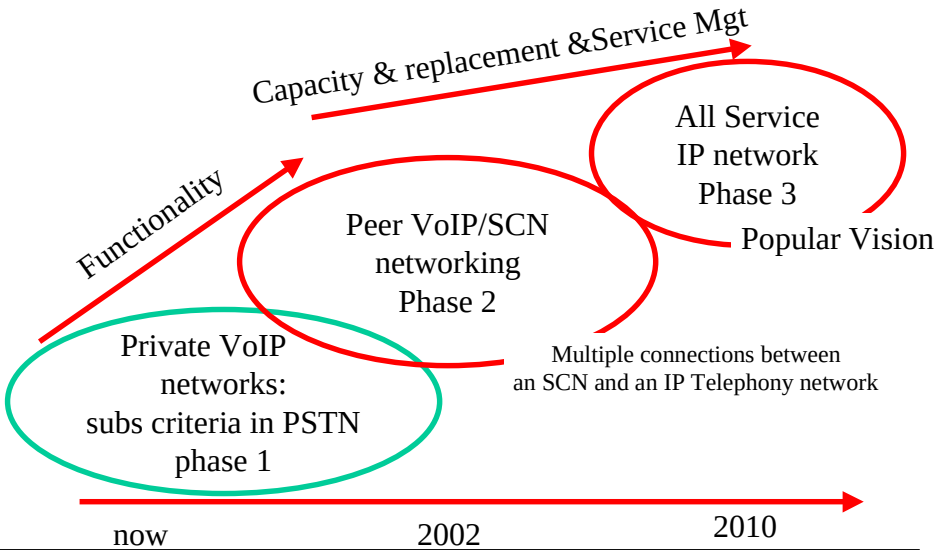
Outline

- Assumptions
- Requirements and Motivation
  - Locating GWs from the IP Telephony network
  - Locating a SG from the ISDN network angle.
  - Number portability across the technology boundary.
  - GSM and 800 numbers.
- The solution
- Summary

Assumtions

- We are headed towards fully peered SCN and IP-telephony networks due to
  - the increase in IP telephony connections and applications and
  - SIGTRANs work
  - many connections between an SCN and an IPT network
- Efficient routing and numbering infrastructure across the emerging hybrid network is a necessity
  - Delay and jitter highly depend on call path
  - We want to minimize the times we need to do media conversion on the technology boundary

Roadmap to the Future



Interoperability Issues

- Signaling and Call control
- Quality of Service

Phase 1 --->

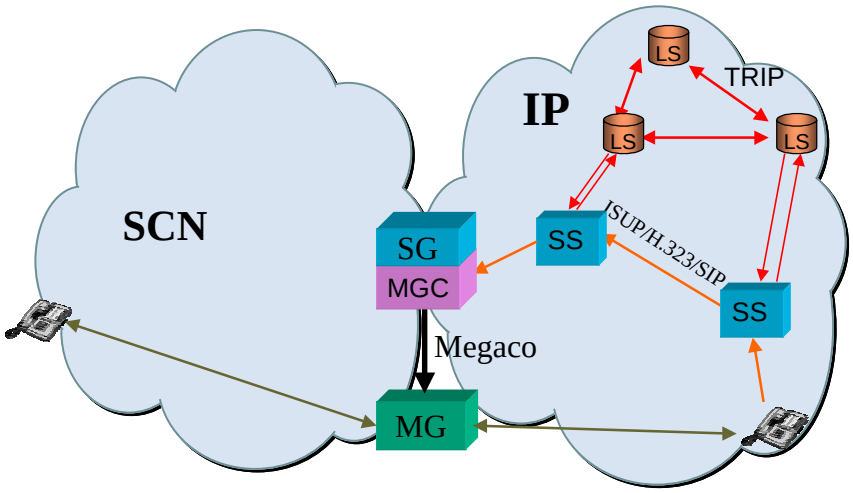
- Telephony Routing and addressing
  - Input Information gathering
  - Alternative routing over IP

Phase 2 -->

- Service Management in the hybrid network

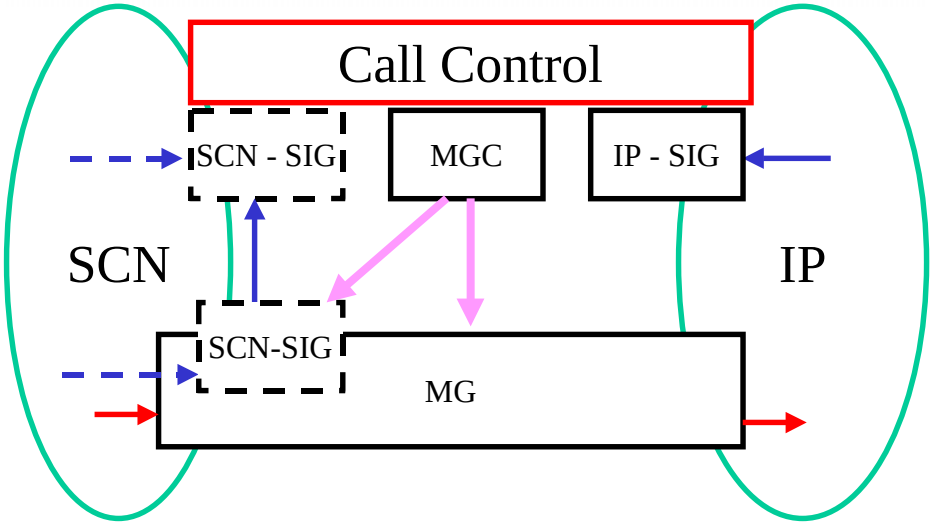
Phase 3

Architecture overview



TRIP = Telephony Routing over IP, SG - Signalling Gateway, MGC - Media Gateway Controller
MG - Media Gateway, SS = Signaling Server, LS = Location Server

Gateway decomposed



GW Location from IP side

- LS provides info about Next hop Signaling server e.g. a Signaling Server or an MGC in the same domain
- TRIP keeps information in LSs updated across IP Telephony systems
- MGCs are registered e.g in LS (this information may be local to an Admin Domain)
- SS can use LS to locate MGC and MG

GW Location from ISDN side

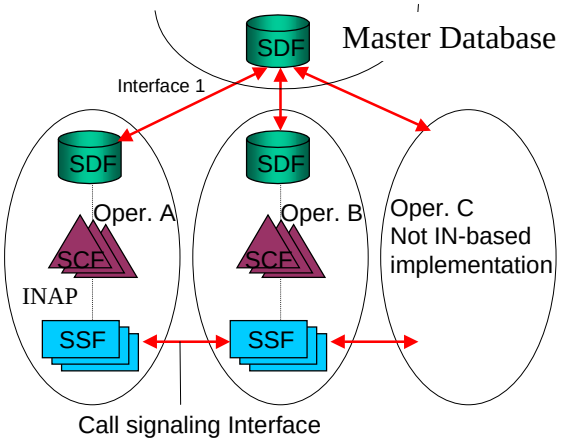
- Good news: SGs are large - easy to locate
- Bad news: I do not hear any body working on the problem of Gateway location from the ISDN point of view
  - From the SCN it is equally important to select the most suitable Gateway for SCN to IP calls

Numbering Issues

- What if an IP Telephony Number is ported to another ITSP operator?
  - ISDN side may need to choose another SG for calls to that number
- What if an ISDN number is ported to another ISDN operator?
  - IP side may need to choose another set of SG, MGC, MG
  - LSs need to know about the change
- What if a number is ported SCN to IP or vice versa

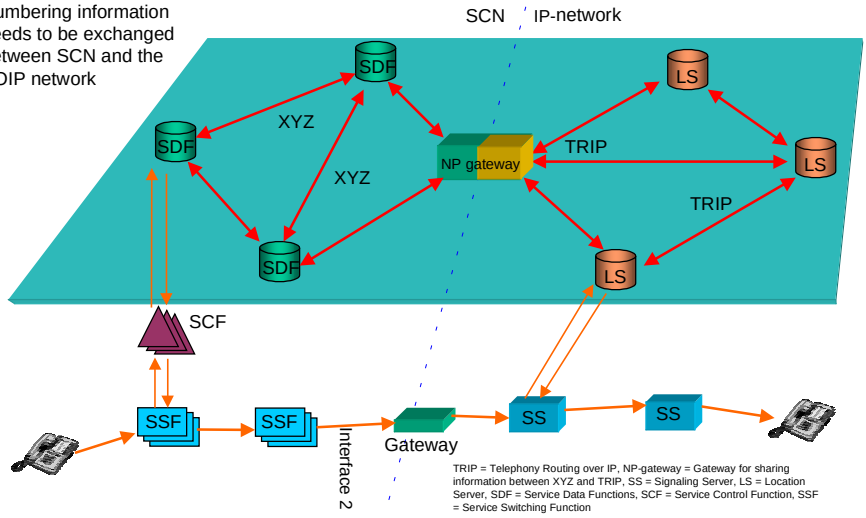
Current situation at the ISDN side

Number Portability is mandated by regulators in Europe and the US
Typical solution is based on IN



ISDN needs a pair to TRIP

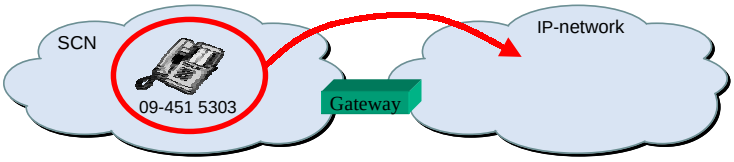
Numbering information needs to be exchanged between SCN and the VOIP network



Requirements for Numbering&Routing

Number portability for IP subscribers

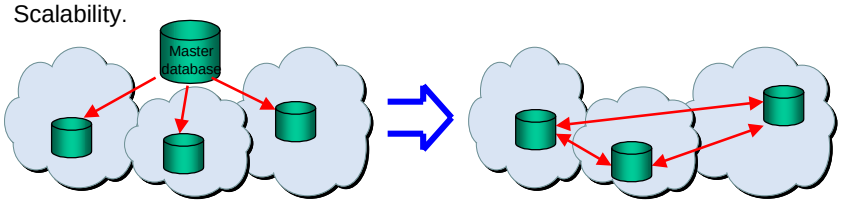
- ✓ Number portability within IP-networks.
- ✓ Number portability between the SCN- and IP-networks.
- ✓ Integration with the TRIP (Telephony Routing over IP) protocol for location of gateways and signalling servers. Integration with TRIP and DNS (enum) for location of IP terminals.
- ✓ Optimisation of routing between SCN- and IP-networks for portable numbers.
  - Location of nearest or most suitable gateway
  - Support for several geographical areas



Architecture for Numbering&Routing

Distributed architecture

- ✓ A distributed database instead of a single master database.
- ✓ No single point of failure.
- ✓ Master DB to SDF Interface replaced by a distributed database based on SCSP (Server Cache Synchronisation Protocol).
- ✓ Database updates made directly by the operators. Support for subscriber-initiated updates possible.
- ✓ Scalability.



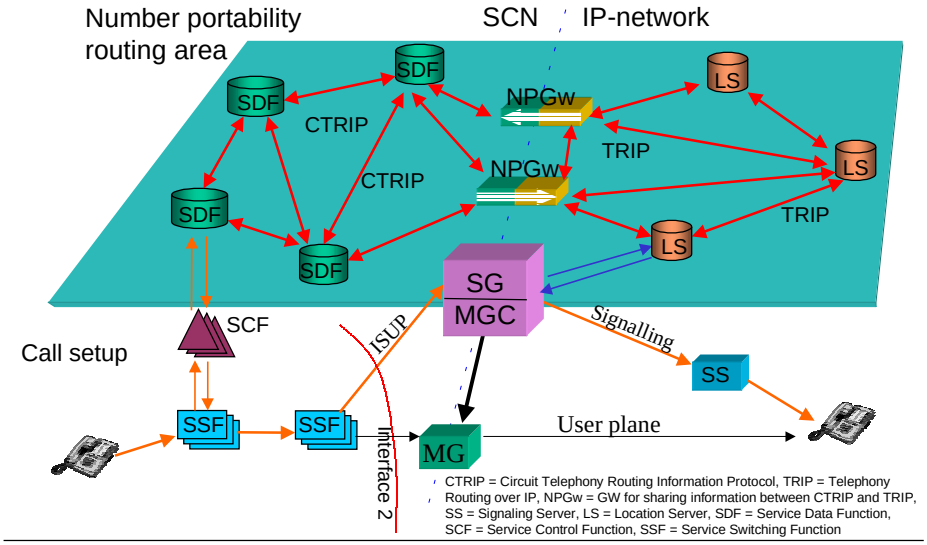
Requirements for 800- and GSM numbers

- IP Telephony view
  - an 800-number and a Cellular Mobile Number may be located anywhere in the ISDN/PSTN cloud or the Cellular cloud respectively
  - additional round of indirection for choosing the GW is needed to ensure adequate quality voice
  - LS needs to cascade the request to an SDF or to an HLR or return the address of an SDF or HLR so SS can make a subsequent query
  - Alternatively a Redirect Server can be used to make the 800- and mobile number queries

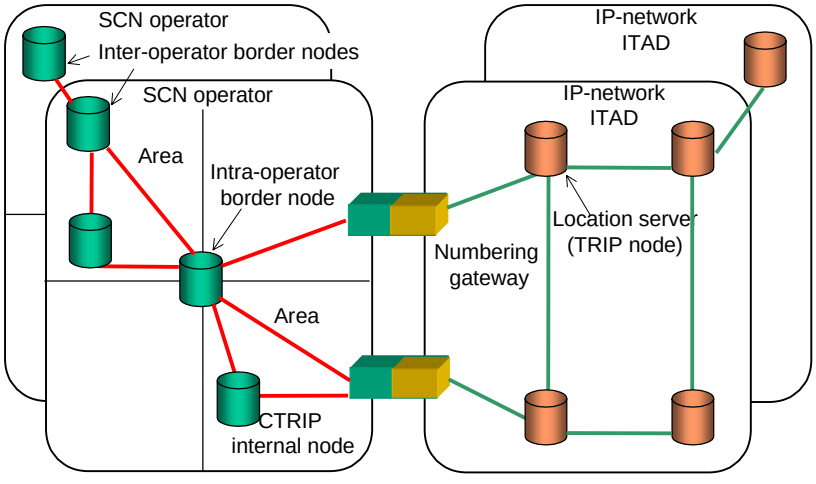
Requirements for 800- and GSM numbers

- SCN view
  - an 800-number (and a Cellular Mobile Number - only a matter of time!) may be located anywhere in the IP cloud
  - additional round of indirection for choosing the GW is needed to ensure adequate quality voice
  - SDF needs to cascade the request to an LS
  - It is not efficient to flood Mobile numbers among LSs when a mobile number is in an IP cloud - a solution scalable to frequent location changes is needed

The solution is CTRIP + Numbering gateway



Functional Plane Architecture



TRIP vs CTRIP

TRIP Information

- Withdrawn Routes
- Reachable Routes
- Next Hop Server
- Advertisement Path
- Routed Path
- Atomic Aggregate
- Local Preference
- Multi Exit Disc
- ITAD Topology
- Authentication

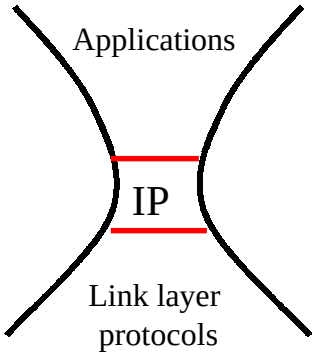
CTRIP Information

- Directory number (key)
- Destination subdomain id
- Signalling capability id
- Routing number
- Area
- Advertisement path
- State

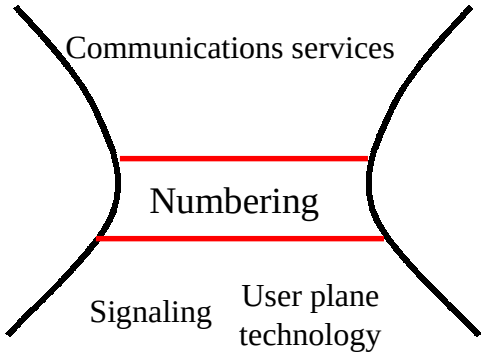
POLICY controls distribution, mapping and aggregation

An analogy

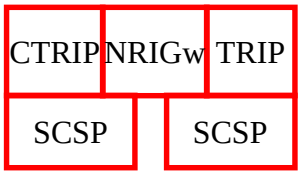
Protocol centered view
"How"



Reachability view
"To whom you can call"



Conclusions



- Gateway model needs to be complemented by Numbering&Routing Information gateways
- SCSP can be the common Numbering infrastructure component for both SCN and IP Telephony networks
- TRIP, CTRIP and possibly ENUM are used to distribute Routing information among Location Servers and SDFs
- Location servers need to be able to cascade requests to cater for 800-numbers, any service specific routing methods and for mobility