Session 6 - Operator Implementation Overview

Orange Labs

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Overview

- Introduction
- Problem statement for NP for an operator
  - Role and limitations of standards
- NP implementation issues Network impacts - the “NP variants”
  - fixed NP - LNP
  - mobile NP - MNP
  - IMS/NGN NP
- Beyond: new drivers for NP
- Operator environment for centralised MNP/LNP data

INTRODUCTION

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- Environment for centralised MNP/LNP DB

Introduction

- Rationale: *this talk will progress through the stepwise process of introducing NP in a operator's networks and systems*
- Several implementation options for NP
  - But general trends towards ACQ
  - Sharing data =/= sharing dataBASE
- NP variants exist depending on the network and service type
- Not addressed here: service number NP
  - from day 1 - they involve translation by nature
  - NP is then 'only' a matter of provisioning & process
- Notes:
  - national differences exist…
  - this is just *a perspective* on NP implementation, not the operator's perspective on NP

PROBLEM STATEMENT

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Constraints related to NP

- Internal technical constraints for routing
  - Some number ranges are dedicated to internal PSTN/PLMP
  - Some number ranges are dedicated to third-party operator's PSTN/PLMN
  - Some number ranges are dedicated to internal IP network (H323, IMS)
  - Some number ranges are dedicated to third-party operator (IP, PSTN)
- External constraints
  - Geographic location
    - national dependent policies
  - Tariffs consistency
  - Service structure
  - Porting time
    - main perceived driver for centralized databases
      - counterexamples

An NP infrastructure is not static

- Implementing NP is not a “blank slate / whiteboard exercise”
  - and since routing on number ranges is ALWAYS simpler and cheaper, the odds are that network design has been made with that principle in mind
- For operators, implementing NP can be a stepwise process
  - legacy implementation on PSTN or even GSM
  - upgrades necessary for
    - policy changes related to:
      - regulation: shorter porting times
      - numbering rules: geographic numbering policy
    - new network architectures:
      - IP-based conversational services
      - new services based on numbers (eg content sharing using mobile numbers)
  - market growth…
- Recommendation: *think ahead and plan for next steps (easier said…)*

Where standards can help… and can't…

- In this stepwise process, standards can help for "Step 1"
  - standards have been defined for PSTN routing (OR, CD, QoR, ACQ) and MNP eg ETSI EN 301 716
  - signalling containers/parameters for call control protocols are specified
  - generic standards for NP database – including IP-based network eg enum
  - interfaces to real-time NP databases are generally lightweight Q/R implementations of existing protocols: INAP IdP, LDAP, Enum, SIP redirect…
- Limits
  - Claim: "standards are not good at handling the « n+1 » step" (porting time etc)
  - IT system architectures are not standardized…
    - a number of constraints (process etc.) cannot be addressed by standardized mechanisms
  - internal real time NP databases are versatile
    - they can be used for other things than "just" NP - routing optimizations
- generally, the *technical* solutions ends up being quite specific

NP IMPLEMENTATION ISSUES

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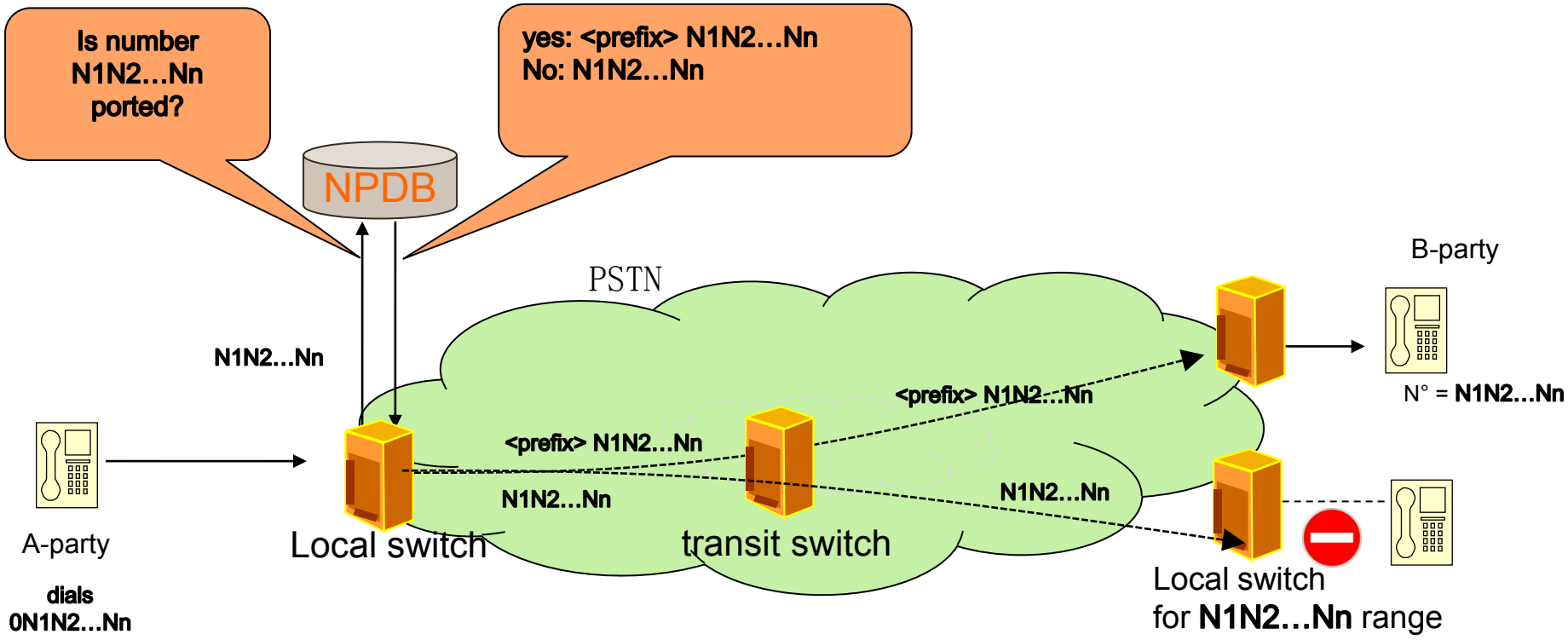
PSTN number portability - basics

- Why?
  - dissociate the number from the service provider
  - same end user access
- How?
  - convert the dialed number into a routing number that conveys the information related to:
    - the *local switch* where the subscriber has been ported
    - the original called party number
  - use a local number portability database to do just that
- These routing numbers come in different shades
  - non E.164 hexadecimal strings
  - national-only prefixes
  - E.164 prefixes

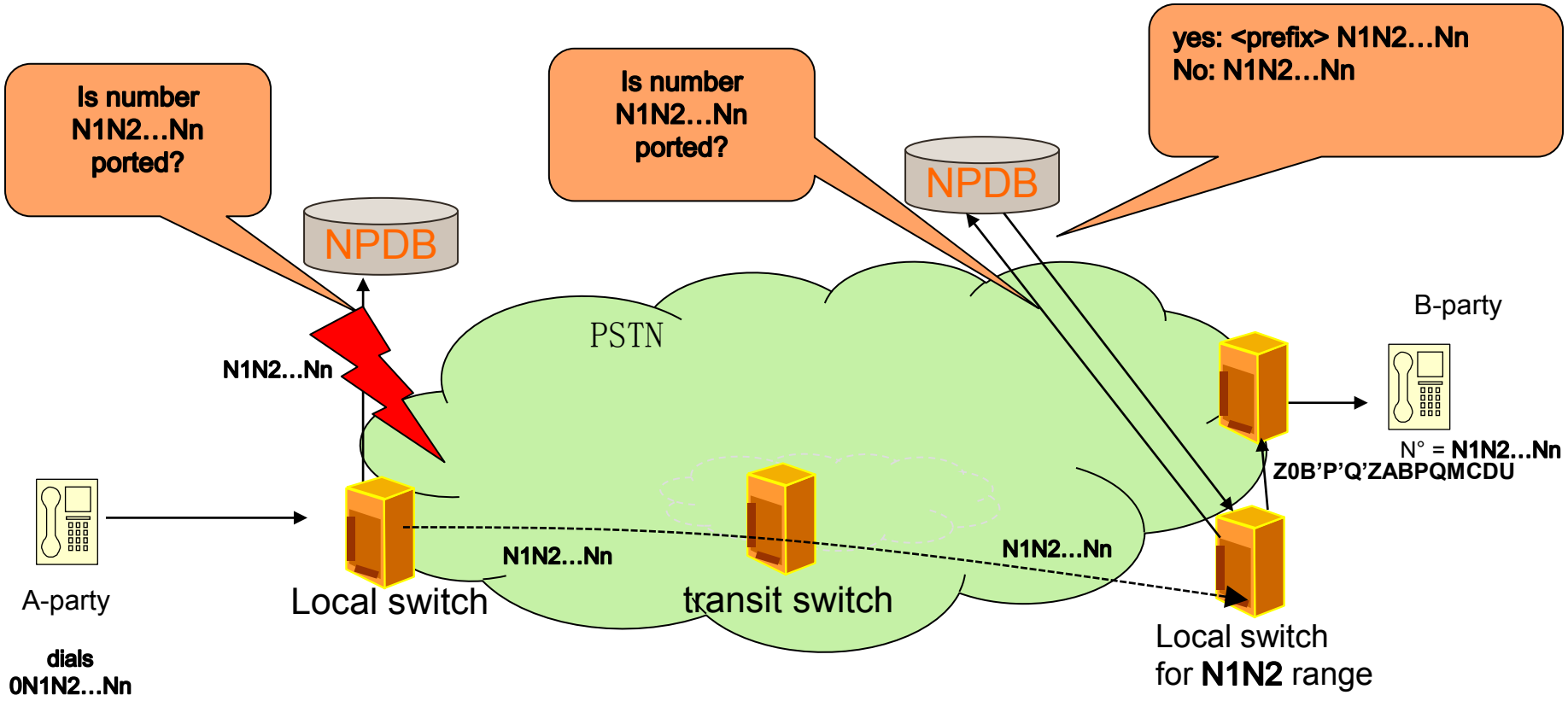
PSTN NP implementation – network impact shortlist

- « ACQ »… but not for all numbers
  - in local switch the only “potentially ported” called party numbers that trigger NP lookup must be marked
- Transit switch NP lookups
  - All local switches may not support NP interface: find the right rerouting synergies between local and transit switches for these calls
  - relevant if NP-correction is provided as a feature of a transit offering
- Engineering common practices and heuristics
  - prevent loops, use specific trunk groups for NP-corrected numbers
  - don’t look up a number for “local” call (called and calling numbers are on the same range)
  - onward routing if NP DB lookup fails
- Undesirable interactions: call back, Calling Name Identity Presentation, etc.

PSTN number portability – basic call



PSTN number portability – basic call fallback for ACQ

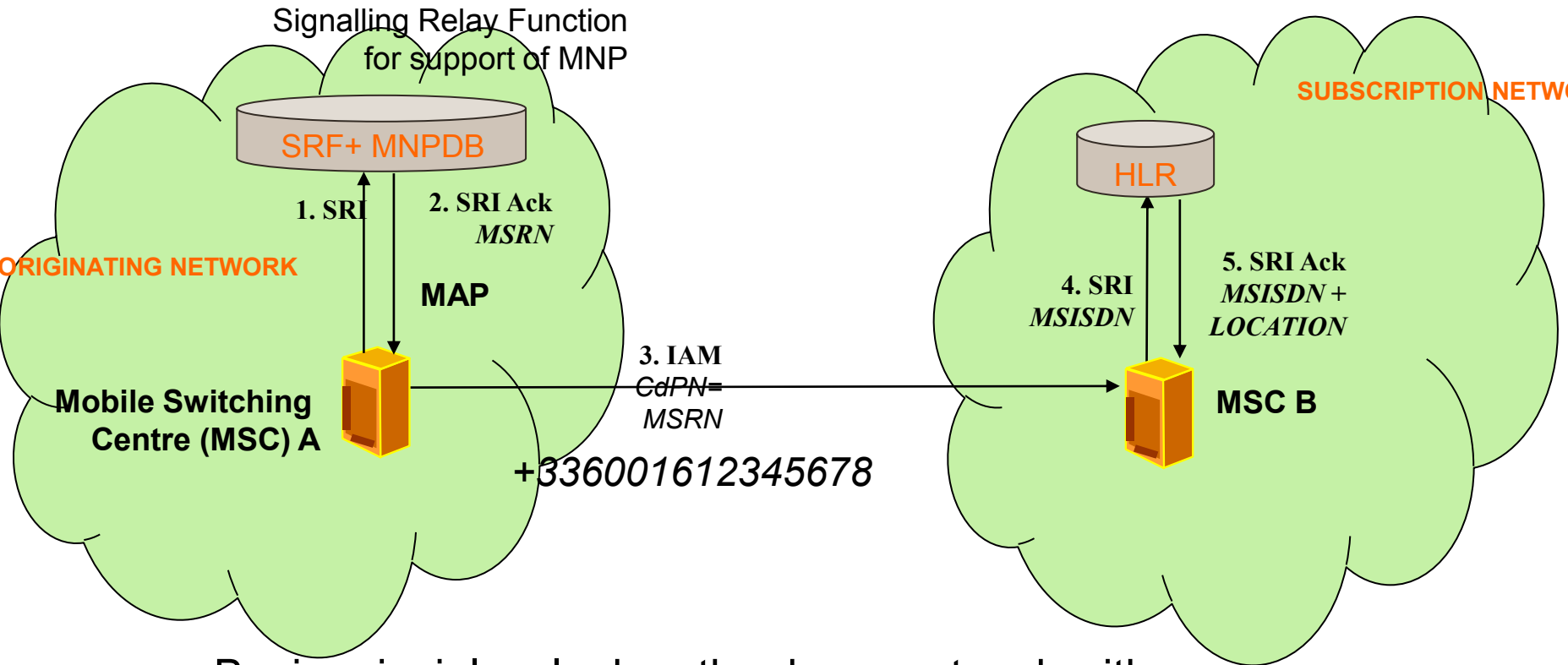


- onward routing as fallback

Mobile number portability (MNP) basics

- Why?
  - same as LNP: dissociate the number from the service provider
  - port a number – not the SIM card
- Main differences with LNP
  - routing numbers don’t identify the local switch but « only the new Mobile Network » or Mobile Network Operator
- They generally use E.164 routing numbers (or non overlapping E.164 numbers conveyed in E.164 parameters eg hexadecimal strings)
  - E.164 is embedded in GSM/UMTS

Mobile number portability – MNP



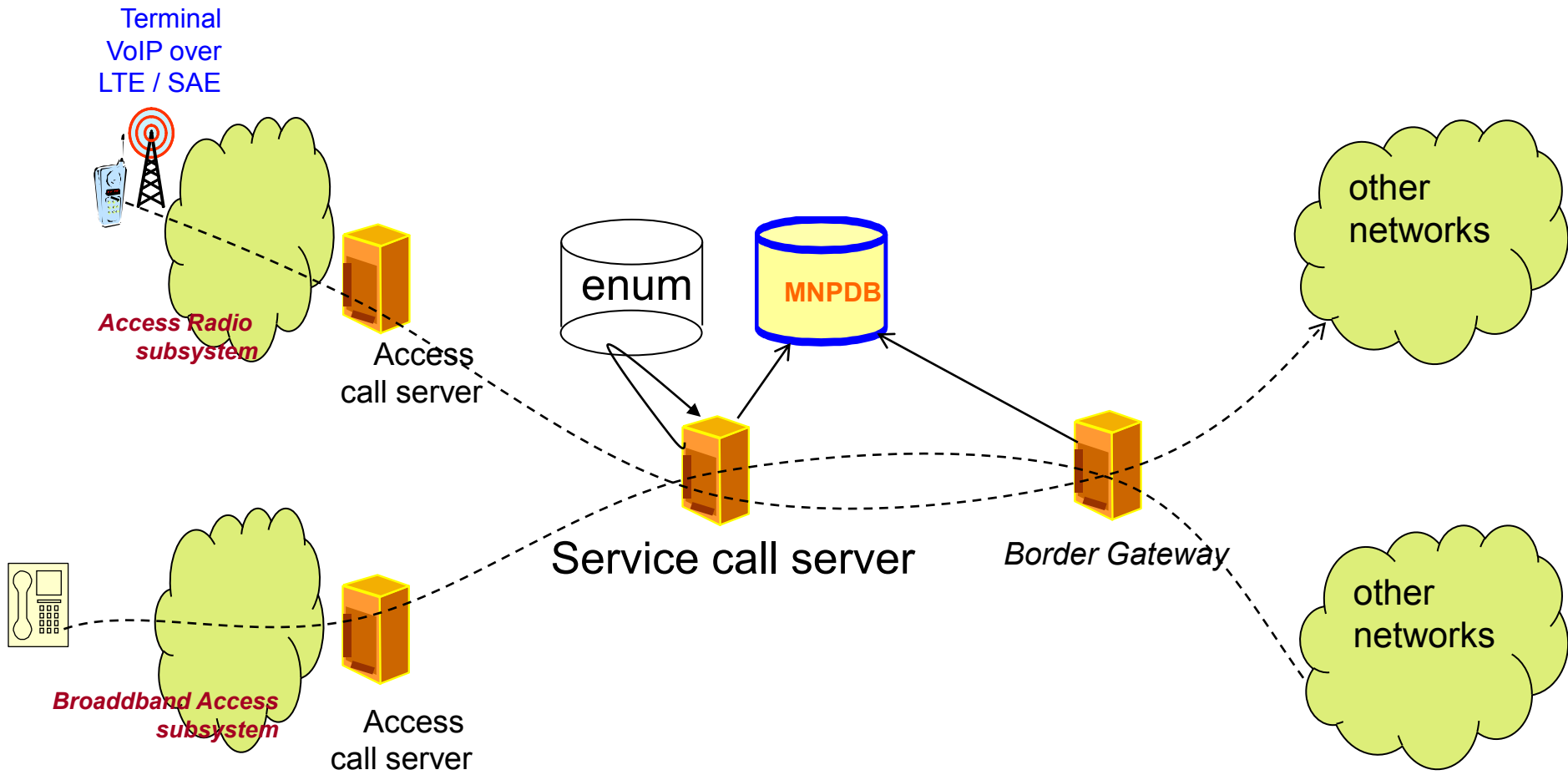
- Basic principles: lookup the donor network with a SendRoutingInfo and get a routing number
- issue: share the routing information

IP-network number portability (voice) - basics

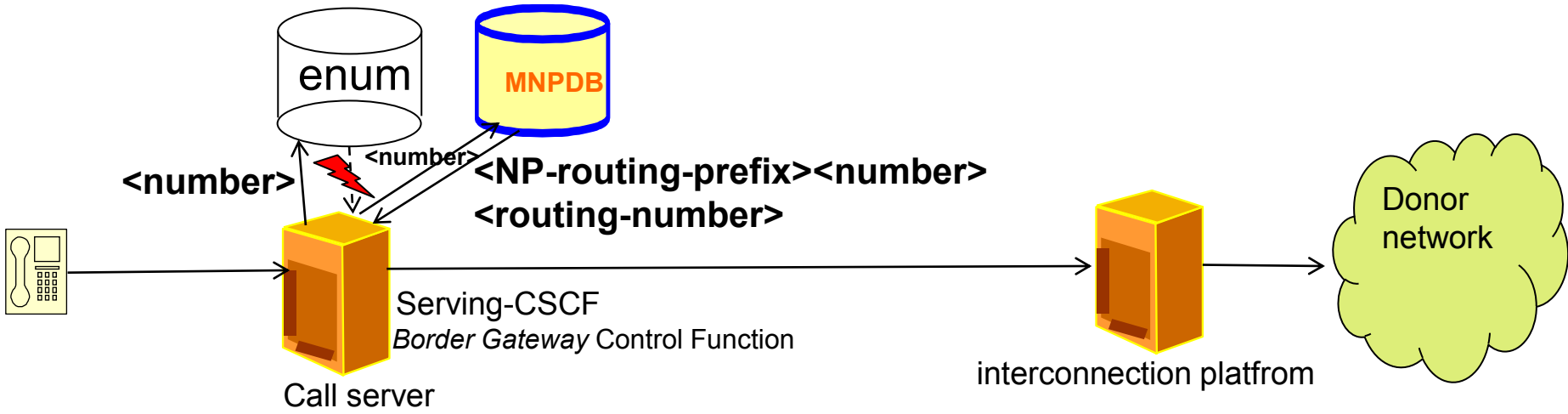
- Why is that a specific case?
  - Ip-based technology for NP were meant to be different
  - late arrival: most of NP implementation complexity comes from the backend systems – this complexity still applies
  - contrary to CS networks there might actually be several IP-based core networks: SIP, IMS, “legacy H.323” etc. market specific networks/offers (enterprise, etc.)
- Theory: “surely you don’t need routing numbers for IP based networks, do you?”
- Issue: what matters is the service
  - so you may port a number from IP to PSTN and vice versa
- Practice:
  - you need a solution applicable to all technologies (CS *and* IP)

  => you need routing numbers – they may identify a service provider (like MNP) or even a “server” (like LNP)

NGN/IMS number portability



Case study IMS – putting NP server and enum servers together



- IMS routing is supposed to rely on DNS-based technology called enum
- BUT it generally proves most costly (or simply unfeasible) to put NP data in enum than to lookup the legacy NP DB
- Consequences
  - use enum for local users URIs (not NP data)
  - legacy NP DB for NP data

BEYOND

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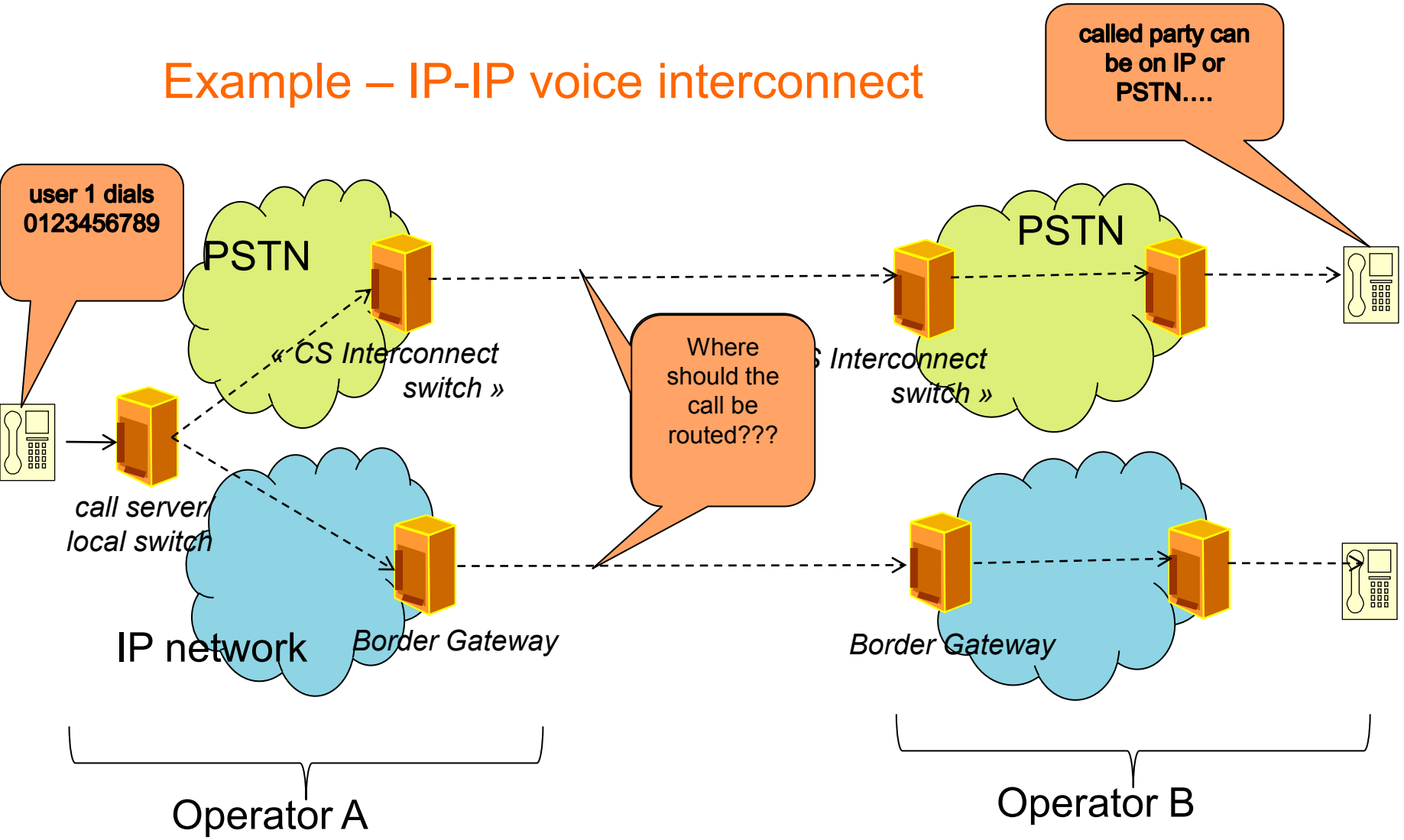
Future uses of NP data for carriers

- New drivers for sharing NP data
  - least cost routing for international calls
    - need for routing a number to the “right” (NP-corrected) operator or at least find the shortest (cheapest) route
    - the drivers for sharing NP data go beyond national boundaries
  - IP-IP voice service interconnect you don’t want to send an « call/session » to the wrong interface/Point of interconnection
    - codec conversion, suboptimal routing, rerouting and extra-transit costs etc.
- What’s next?
  - IP-IP interconnect
    - dedicated points of interconnection, dedicated offerings
  - non conversational services based on MSISDNs eg IM eg Rich Communication Suite

Example – IP-IP voice interconnect



CENTRALISED M/LNP DATA

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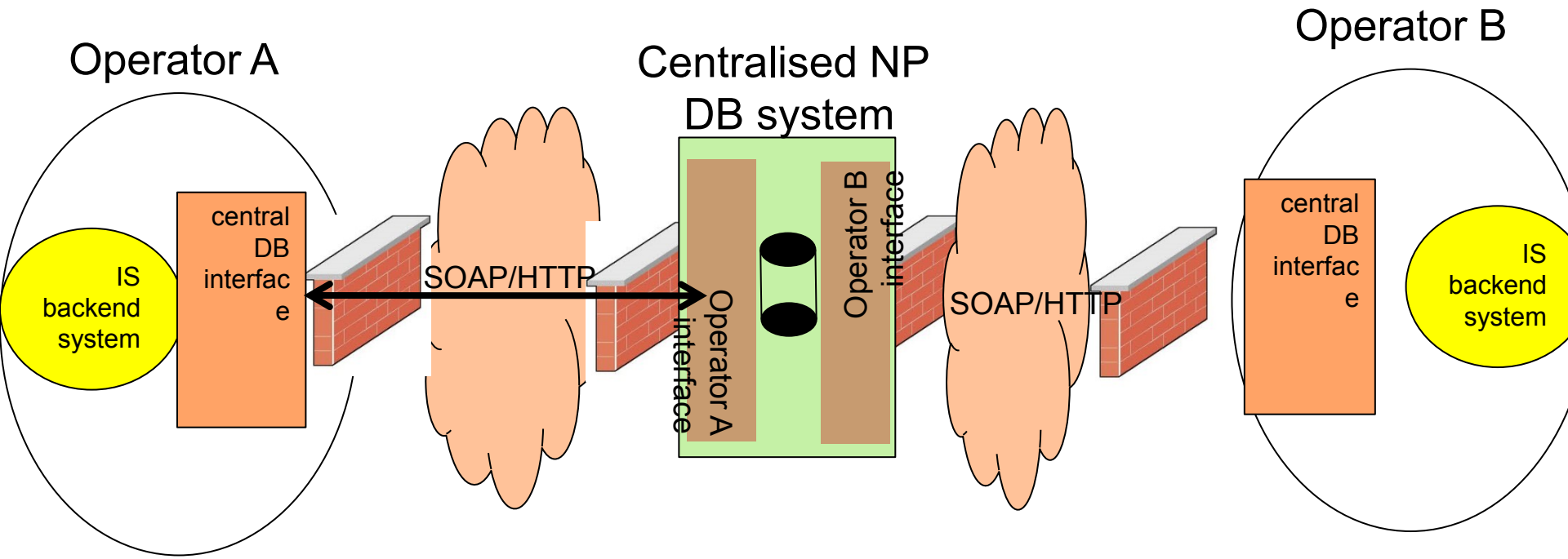
Centralised NP database – architecture (example)

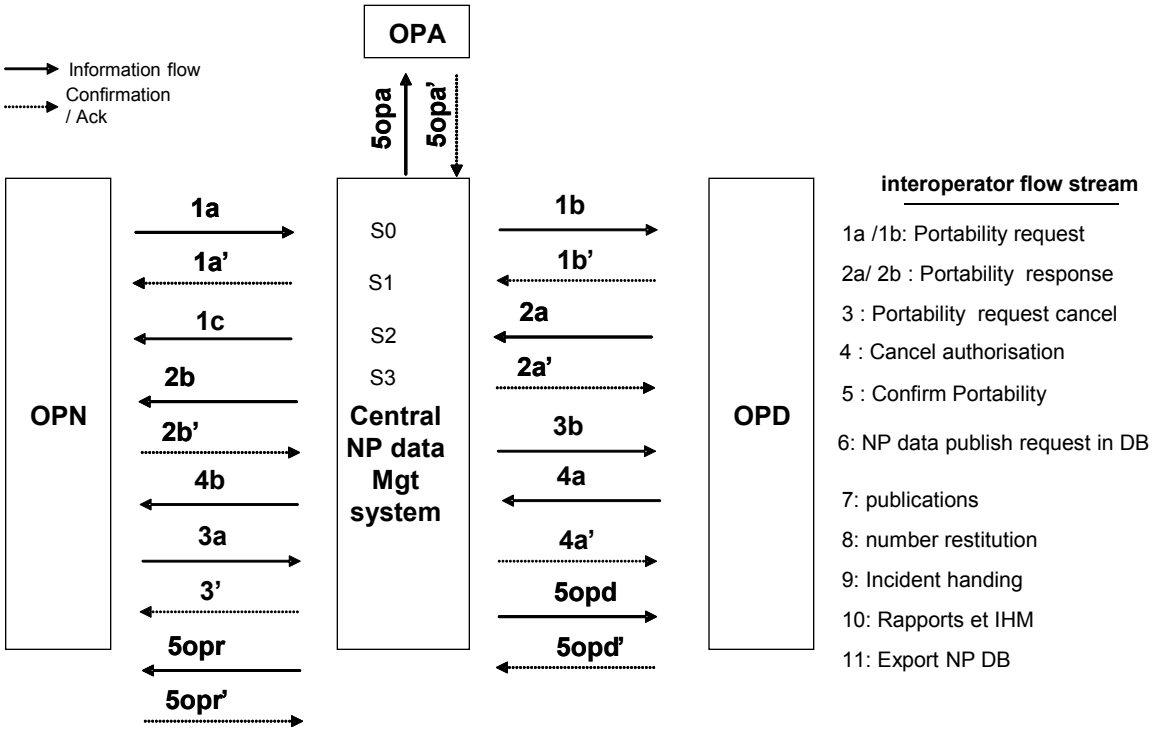


Technical requirements for centralised MNP data – examples

- A centralized managing authority must be able to
  - Authenticate the requesting party
  - Assess the validity of the request
  - coordinate phasing times between donor and recipient operator eg 7 day window + 4 hours of downtime, backtrack procedure
  - generate and manage portability request identifiers
  - notify the originating operator if subscriber cancels subscription (upon notification of the receiving operator)
  - typical NP ticket
    - MSISDN, donor operator, recipient operator, user portability authentication token, requesting date, porting date (< 2 months), porting hour slot.
  - be able to “push” NP data to all (requesting) operators updates applicable to “Day D” for direct routing
  - be able to answer pull request or export (full DB) on demand

Flow stream

Interoperator information diagram



Services implemented by Central NP data Mgt system

SO : Ack (ex: 1a)

S1 : Receipt + logs +treatment+ response

S2 : Porting Confirmation (« Go » given by NP registry)

S3: Publication in central DB

Operational, commercial & process-related constraints

- It can be difficult to provide a definitive date+hour to customers when third parties are involved eg local unbundling
  - Sometimes NRA would accept that estimates be given and progress report made to customers
- Porting time: different applicable constraints may apply to different market, eg mobile, enterprise, fixed etc.
- How should the portability process and information be made available to customers?
- Partial portability for LNP: ported number not used as CLI for IP based lines.
- Consistency with national directory when it exists
- “Technology non-neutral” numbers: LNP impossible from IP to TDM
- Importance of backtracking: if something fails, be able to get back to “square 1”

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Conclusion

- The complexity for an operator depends on
  - the heterogeneity of its networks: CS vs PS/IP based technologies
  - “how old their systems are”: each network’s NP implementation creates new constraints
  - the number of subscribers…
- The more “mature” the network, the more impacts you’ll have
  - if you have PSTN, mobile network, and IP-based architectures, implementing NP turns out to be a very (very!) complex problem
    - migrating to a “brand new NP architecture” is generally a non starter
  - needless to say: incumbents will probably be more impacted