Signalling protocols over IP - convergence is needed

i3 forum Technical Workshop

"Collaborating for an IP future"

Warsaw, June 15th -16th 2010

Geoff Brown, Head of SIP Network Delivery & Management
BT Innovate & Design

international ip interconnection

i3 forum

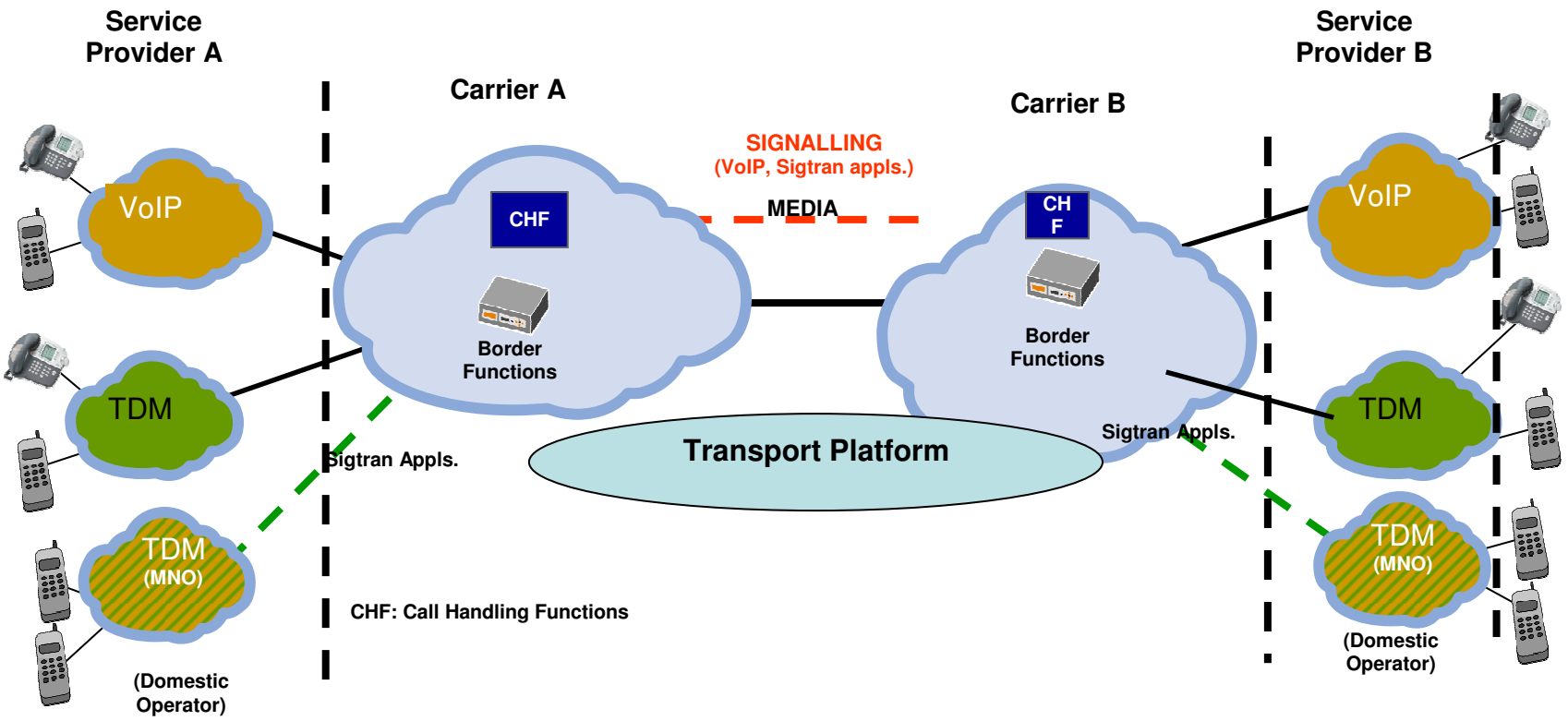
Presentation Content

- Context
- Major Mapping Issues
- The Fundamental Problem
- Major issues with the ITU/3GPP Scheme
- Major issues with the IETF Scheme
- Interoperability between Schemes
- Mitigation methods
- i3 Forum proposal for the future
- Implementing the future standard

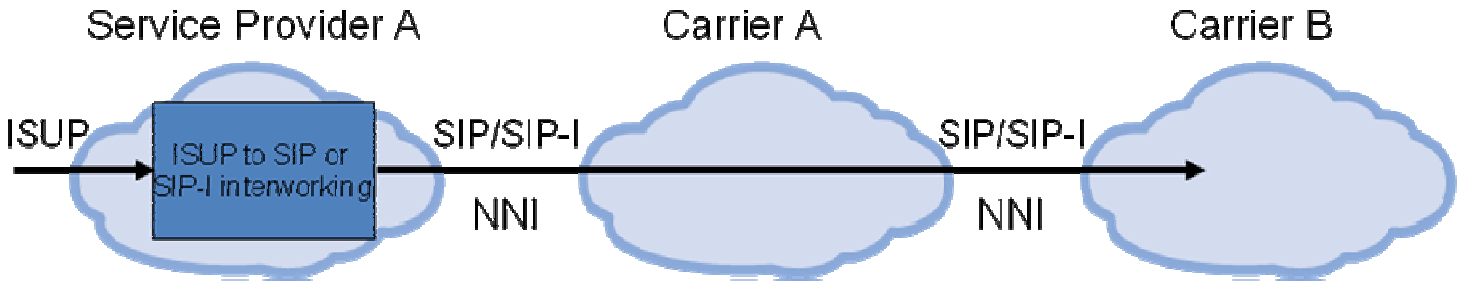
Context

- i3 Technical Issues working group
  - Began addressing ISUP > SIP and SIP>ISUP mapping in Nov 2008
  - Captured key issues by the end of Phase 2 activity, May 2009
  - Issued first White Paper May 2009 outlining the major issues
  - Further study throughout Phase 3 (Sept 09 – May 10)
  - Noted existing initiatives
    - Internet Draft on use of Reason Header
    - CRs into 3GPP
  - First contact with Standards bodies to begin dialogue regarding resolution

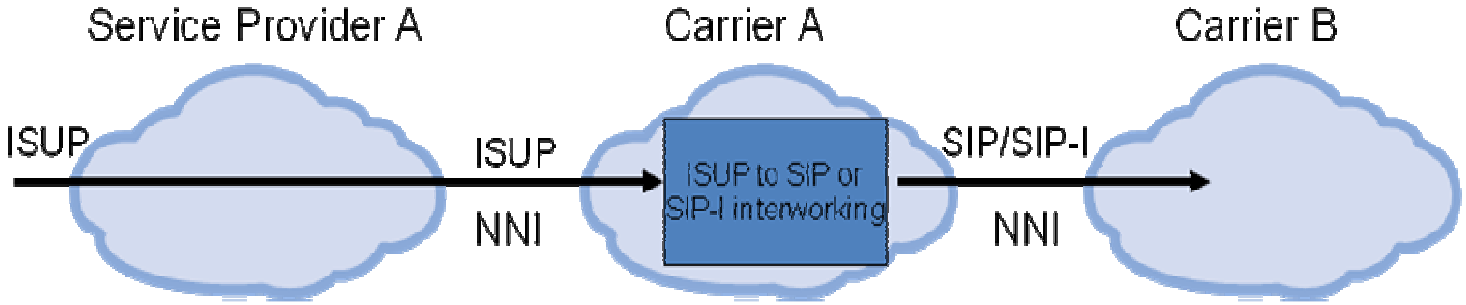
Reference Configuration



Example Interworking Function Locations



Interworking is performed in the Service Provider A network.
Carrier A and Carrier B are unaware of ISUP - SIP mapping



Interworking is performed in the Carrier A network.
Carrier A is responsible for ISUP - SIP mapping
SP-A and Carrier B are unaware of ISUP-SIP mapping

Major Mapping Issues overview

- Three conflicting mapping schemes in use
  - ITU Q1912.5 Annex B
  - 3GPP TS 29.163
  - IETF RFC 3398
- 3GPP is closely aligned to ITU standard and most analysis has been carried out against the ITU mapping and the deltas with 3GPP noted
- RFC3398 is a completely different mapping scheme to that of ITU/3GPP and the two mapping standards are incompatible with each other.
- Does this matter?

…Yes it Does!!!

- On an end-to-end call flow between Service Providers and across intermediate Carrier networks, worst case, two or more mappings can occur.
- There can be no end-to-end certainty of the initial reason returned from the terminating SP or User Agent.
  - QOS measures are compromised
  - Call treatment may be incorrect
  - Trouble investigation difficult
  - Trouble resolution problematic
- All leading to loss of quality of service delivered to the end customer and between SPs and Carriers

The Fundamental Problem

- The ISUP protocol has 127 Release Cause values
  - Full granularity as to exact nature of the indicated event
  - Release Cause values supplemented by Location information
  - Cause & Location are used to determine call treatment and QOS measures
- The SIP protocol has comparatively few Error Code values available for use
- This results in a ‘many-to-few’ mapping that cannot retain the original level of information and mapping back to ISUP can completely change the Release Cause returned to the originating SP node.

Major Issues with ITU/3GPP schemes

- This standard maps many different SIP Error Response codes to Release Cause 127
- Many ISUP release causes are mapped to SIP Error Response code 500
- Major loss of information granularity in either direction

Major Issues with IETF Scheme

- Although this has greater granularity than the ITU/3GPP scheme, with multiple mappings, the resultant output, either SIP or ISUP is not consistent, so the information returned changes at each mapping activity.

- Worst case, this can take five mapping iterations before the mapping stays constant
  - and *mapping stability has been achieved*

Example of Mapping Instability

- ISUP Cause 19, any location maps to SIP code 480
- SIP Code 480 maps to ISUP Cause 18, network location
- ISUP Cause 18/network maps to SIP Code 408
- SIP Code 408 maps to ISUP Cause 102/network
- ISUP Cause 102/network maps to SIP Code 504
- SIP Code 504 maps to ISUP Cause 102/network.

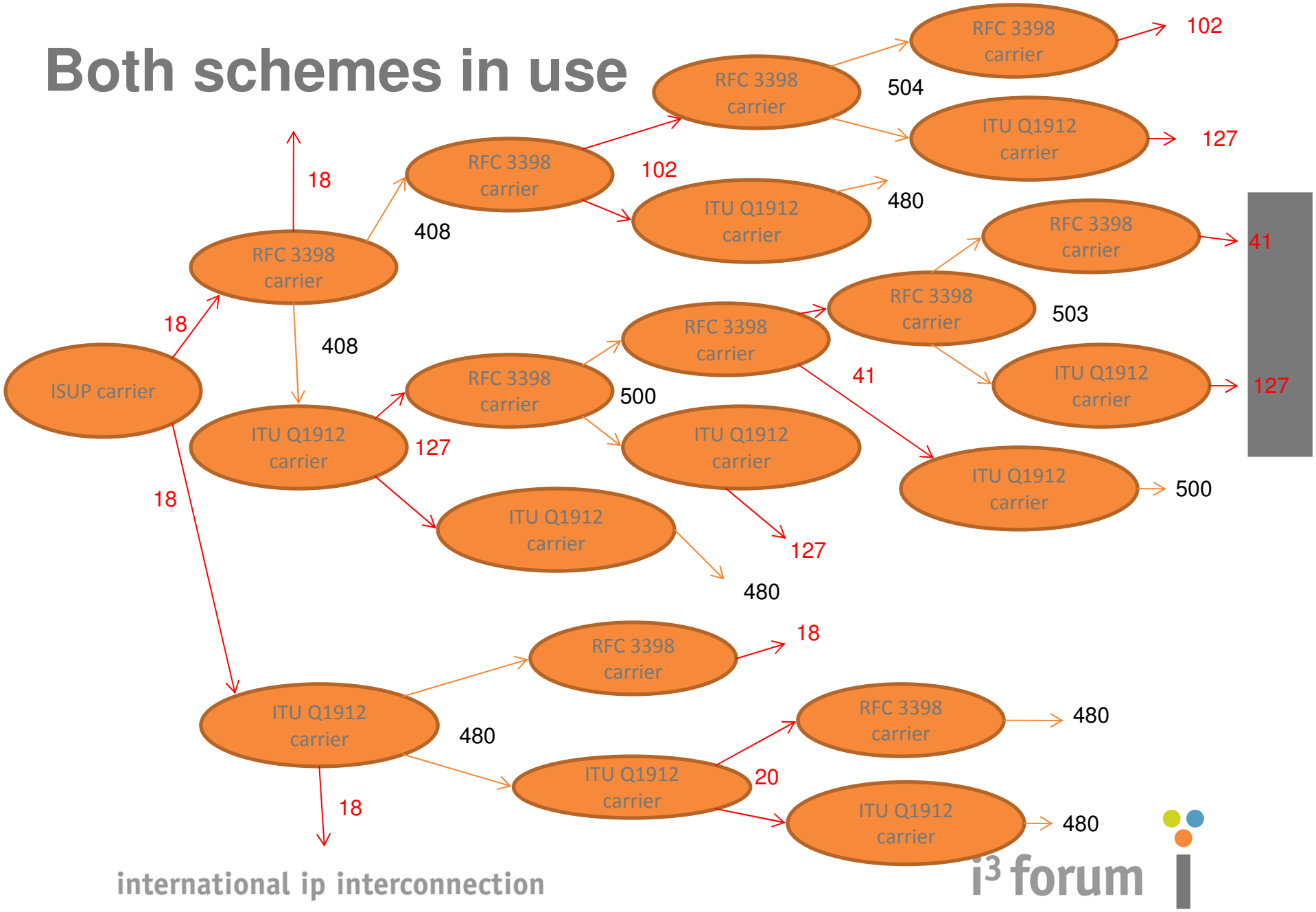
✓ Stability achieved after five iterations!

Can it possibly be even worse?

- Well, yes it can – on an end-to-end call flow, both the ITU/3GPP scheme and the RFC 3398 scheme could be used by different platforms!

- Need to minimize this risk by clear communication between Carriers and interconnecting Service Providers to achieve highest possible level of compatibility.

Both schemes in use



Mitigation Method 1 - SIP-I

- When both interconnecting platforms support this, use SIP-I as the protocol – preserving in full the ISUP information returned from a terminating ISUP node

  - Note that this still has issues when either end is SIP
    - SIP Termination: no ISUP information available
    - SIP origination: no way to interpret it in the other.

Mitigation Method 2 - Reason Header

- Where SIP-I cannot be used, then implementation of Reason Header to RFC 3326 is strongly recommended.
  - Note that this still has issues when either end is SIP
    - SIP Termination: no ISUP information available
    - SIP origination: no way to interpret it in the other.
  - A further limitation is that Location information is not preserved causing, for example
    - Cause 34 cannot be treated differently depending on whether the location is USER = User Busy, or location is Network = network congestion that would enable ‘crank-back’ selection of an alternative route.

The i3 forum proposal for the future

- The industry agrees a single mapping standard that delivers best-fit preservation of information.
- Currently working towards a consensus within i3 forum of what that scheme recommendation will be.
- Intent is to support the submission of Change Requests (CRs) into 3GPP CT3 Working Group by participating member delegates.
- Once a new standard is agreed, encourage vendors to implement as quickly as possible

Implementing the future standard

- SPs and Carriers need to recognise and manage the implementation for the mapping change on their platforms.
- Can vendors provide a per-destination ‘switch’ in order that cooperating SPs/Carriers could implement between each other simultaneously?
- If this is not possible, then unexpected interworking behaviour could occur until all platforms become compliant.
- The industry needs to fully address implementation methodology to minimise service impact

Thank you

Geoff Brown
geoff.brown@bt.com

international ip interconnection

i3 forum