i3 forum
international ip interconnection

Routing Optimization and Service Assurance for LTE/IPX

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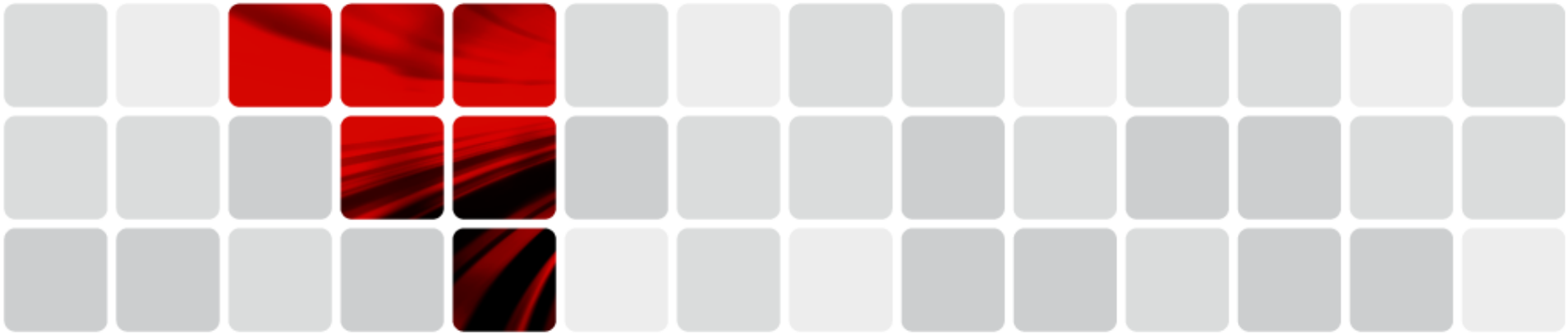
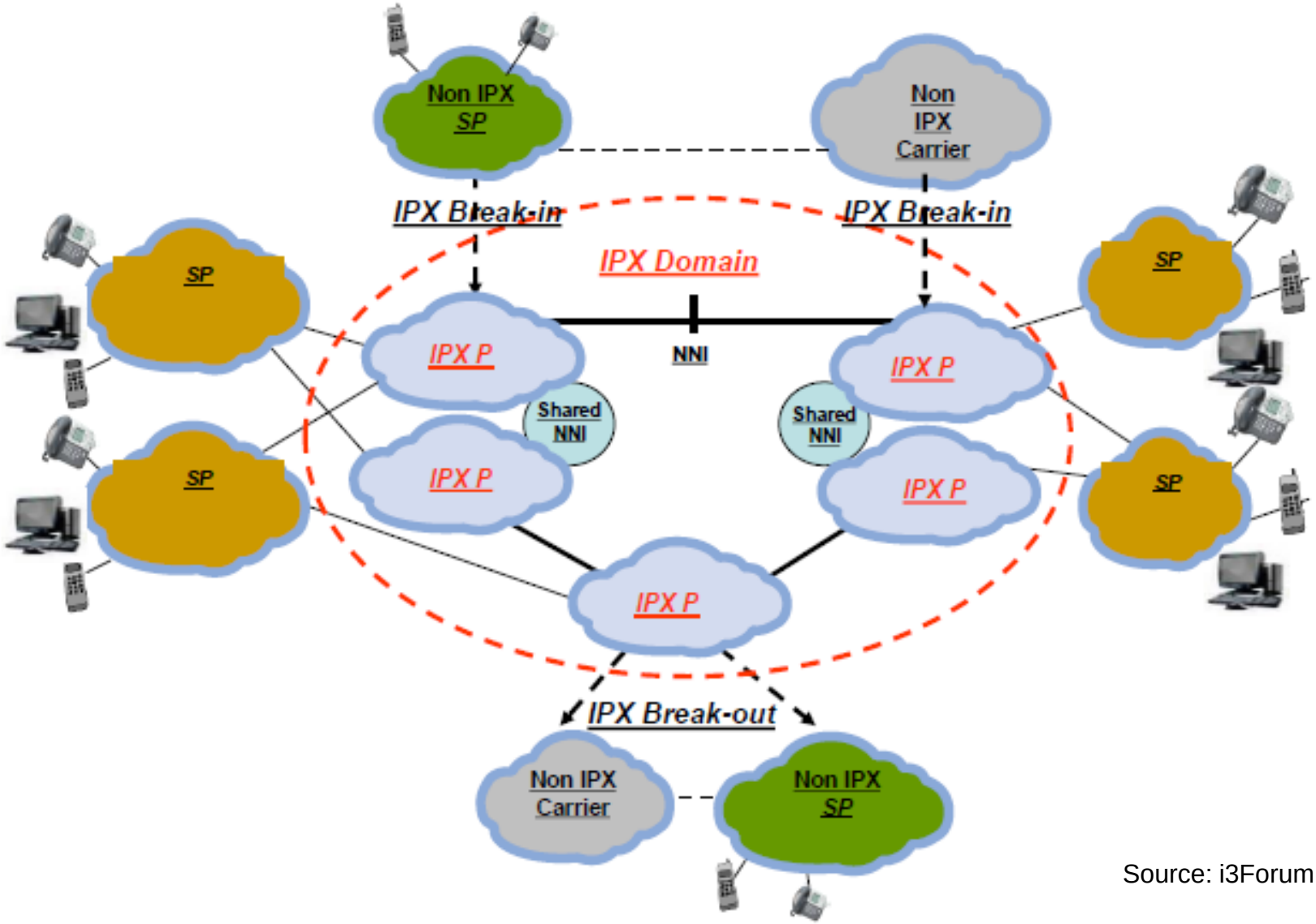


ASCADE

Ascade is now part of CSG International.

CSG INTERNATIONAL

Network Ecosystem of tomorrow



Source: i3Forum

New choices… the complete picture!

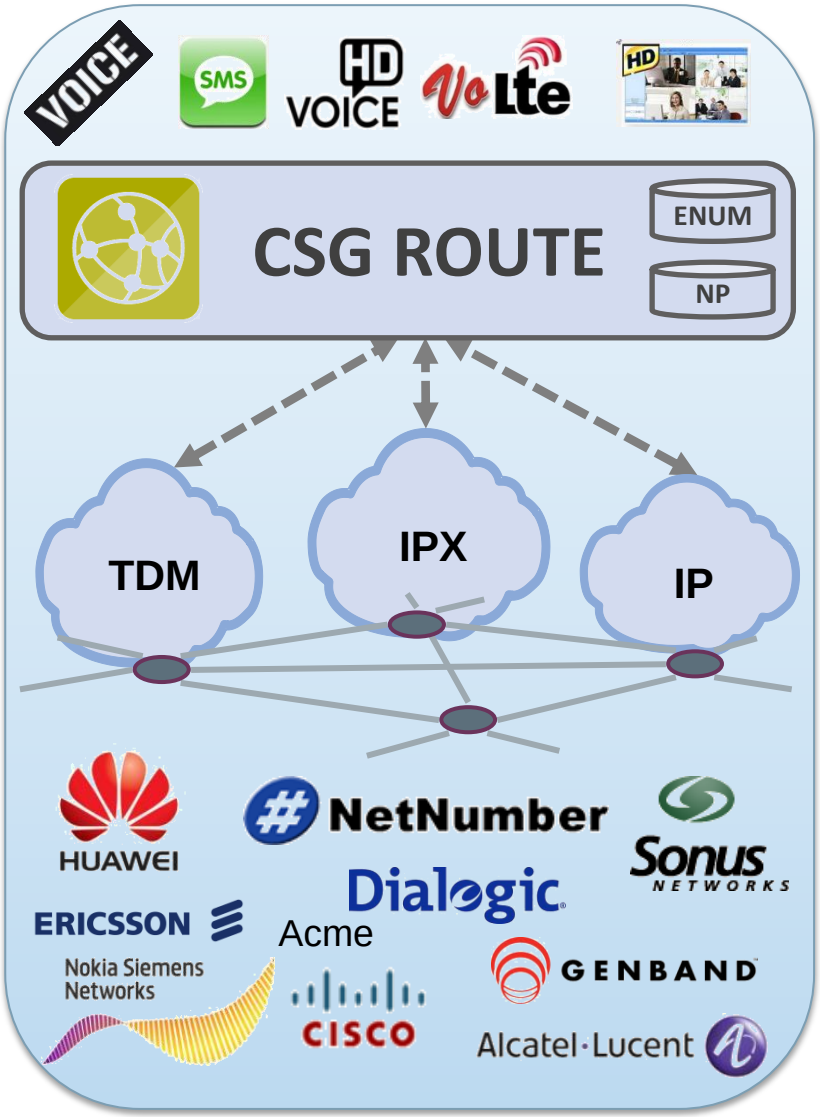
New

Routing Decision Points:

- QoS / *New KPI's*
- Rate / Tiers
- Commitments / Bundles
- Connectivity required (Direct, Indirect, Break-out connectivity)
- Capacity / Volume
- Origination Service / *Session type*
- *Codec requirements* (match codec to minimize transcoding)
- Supplier Product / Service Differentiation
- Destination address / Dial Codes / *TEL-SIP URI*
- Destination address resolution / *ENUM* / NP lookup
- Destination type SIP / TDM (SIP or SIP-I)
- Origination / Dial Codes / Country Codes / SIP URI
- Jurisdictions / Regulatory issues

CSG Routing Approach

- Define **Optimized Routing Policies** for each service
- Consider all **business and technical parameters**
- Enable **Centralized Routing Control**
- **ENUM and NP** address resolution
- Solution for **all major network equipment providers**



Service Assurance

Need for Quality

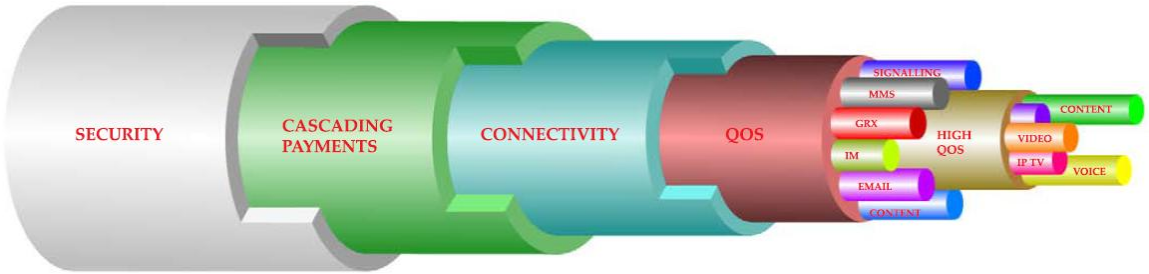
General Approach

- Monitoring (supervision) against given thresholds (QoS reporting)
- Troubleshooting where breached
- Service Level Agreement (SLA)

Recommended QoS Measurements for IPX:

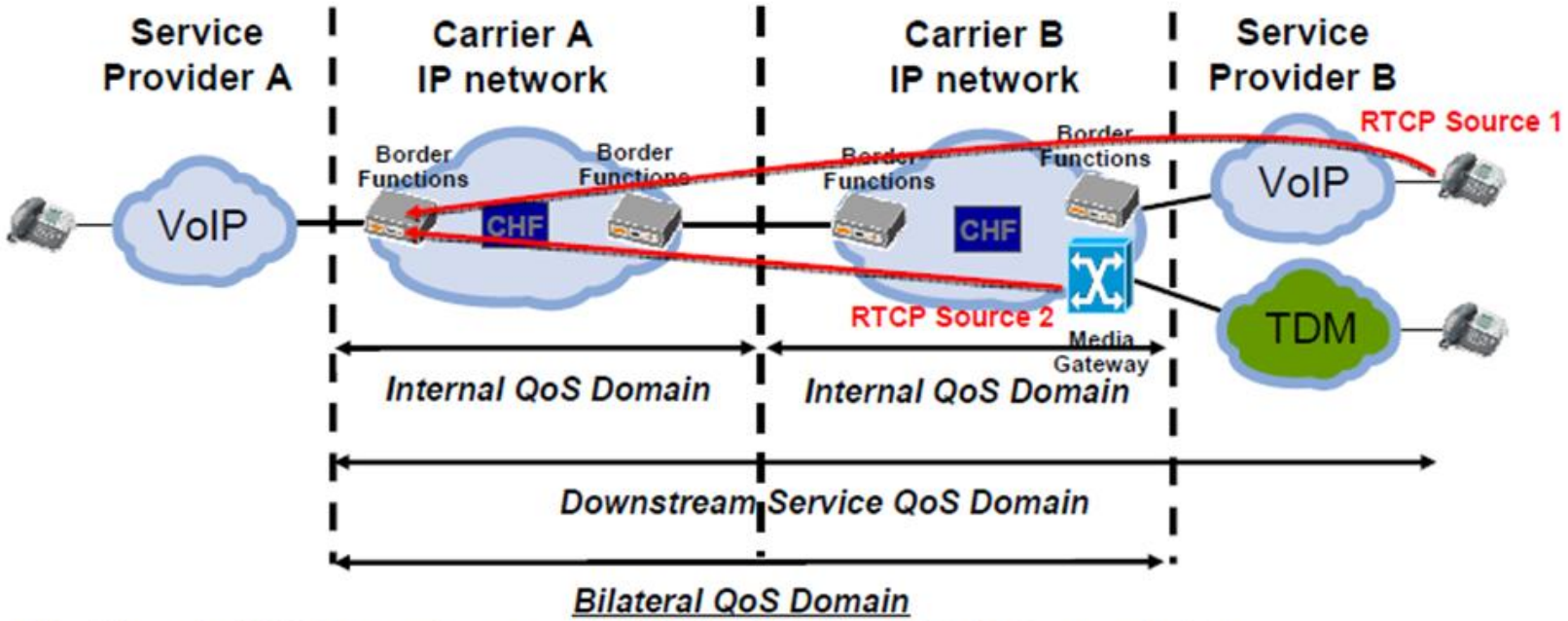
Source: i3Forum

- Transport parameters
  - round-trip delay
  - jitter
  - packet loss
- Service parameters
  - MOS CQE / R-factor
  - ALOC
  - ASR
  - NER
  - PGRD (PGRD is preferred over PGAD)
  - CLI (not mandatory but recommended)
  - Service Capabilities, e.g. HD Voice (new)



Successful measurements however harder to achieve in practise...

Challenges with ensuring QoS

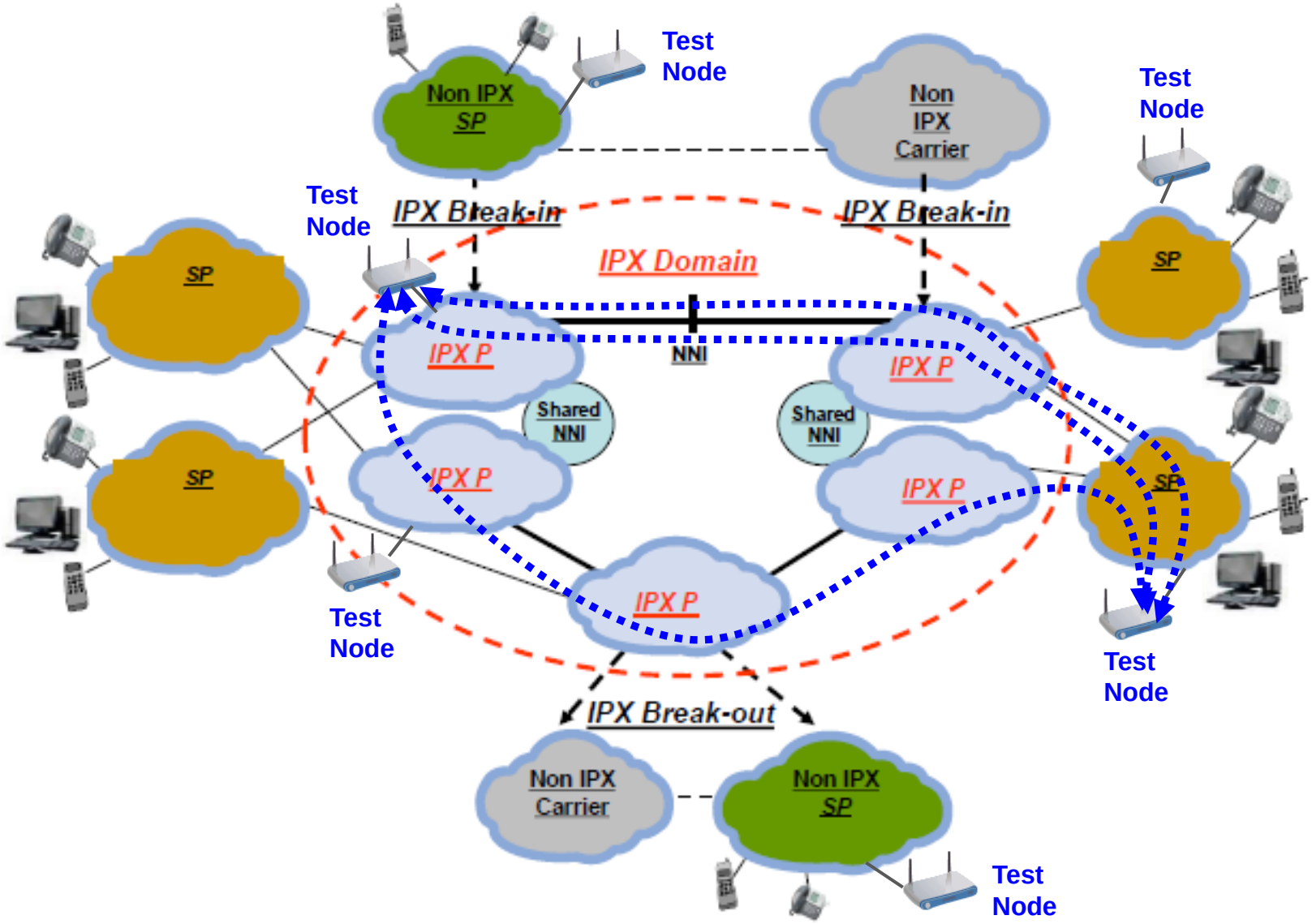


- Problem 1: RTCP report source ambiguity between RTCP Source 1 & 2
  - → Carrier border function does not know what it is measuring!
- Problem 2: RTCP measurement to end user device is not useful
  - → Quality across the carrier domains needed, end SP quality useful but not needed

Problems 1& 2 exists in all use cases, however depending on the relationship between carriers RTCP can be made to work, e.g. in a controlled Bilateral case

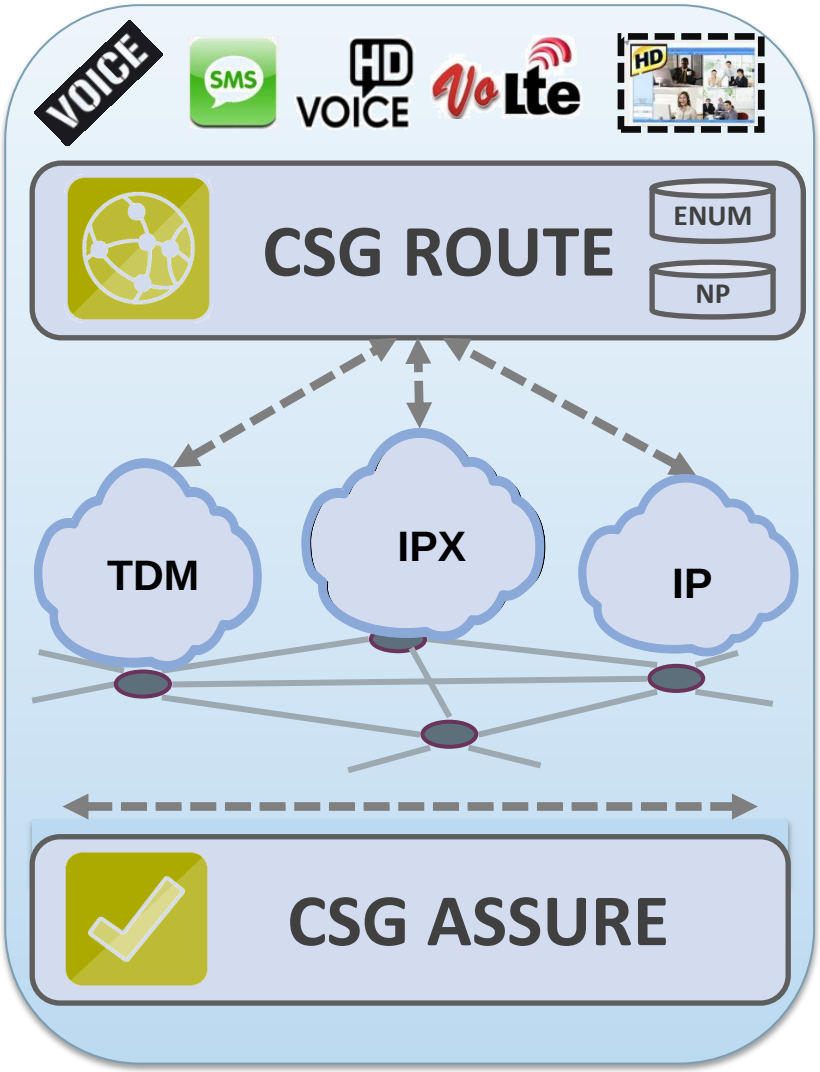
Source: i3 forum

CSG Active QoS Testing



CSG Solution Approach

- Identify **all possible Routes to** Service Provider termination
- Map out all **Service Capabilities, Availability and QoS KPIs**
- **Execute Test schedules**
- **Test nodes** already in operation at more than **400+ Service Provider networks**
- Nodes provide **secure KPI feedback results "out of band"**
- **Pro-active testing** for SLA mgt
- Perform **Routing Optimization** based on feedback



CSG Recommendations

- New and **Additional Routing Parameters** to consider
- Combine **Commercial and Technical Routing** for optimal results
- **Challenges** in how to obtain **reliable/un-ambiguous QoS KPIs**
- Strive for **True QoS Test Cases** e.g. from carriers ingress point to end user
- Enable **smarter routing with ENUM and NP look up's**
- Aim for **Centralized Routing execution for IPX and TDM legacy networks**

Thank You!