QoS Control and Monitoring in IPX

Session on "QoS Control and Monitoring"
2nd Annual i3 Forum Conference, Washington DC

May 26, 2011

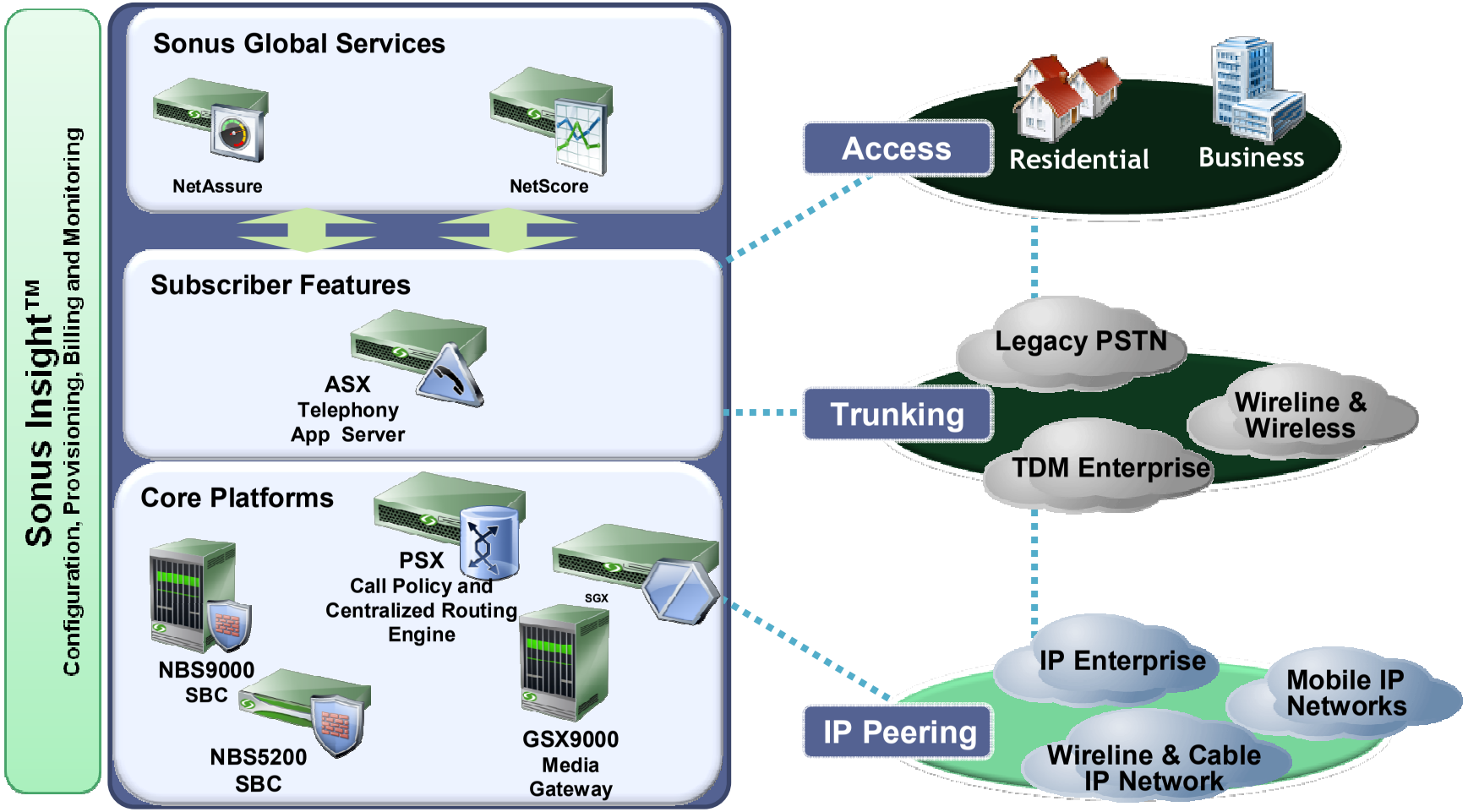
SONUSNETWORKS.COM

Sonus NETWORKS

Agenda

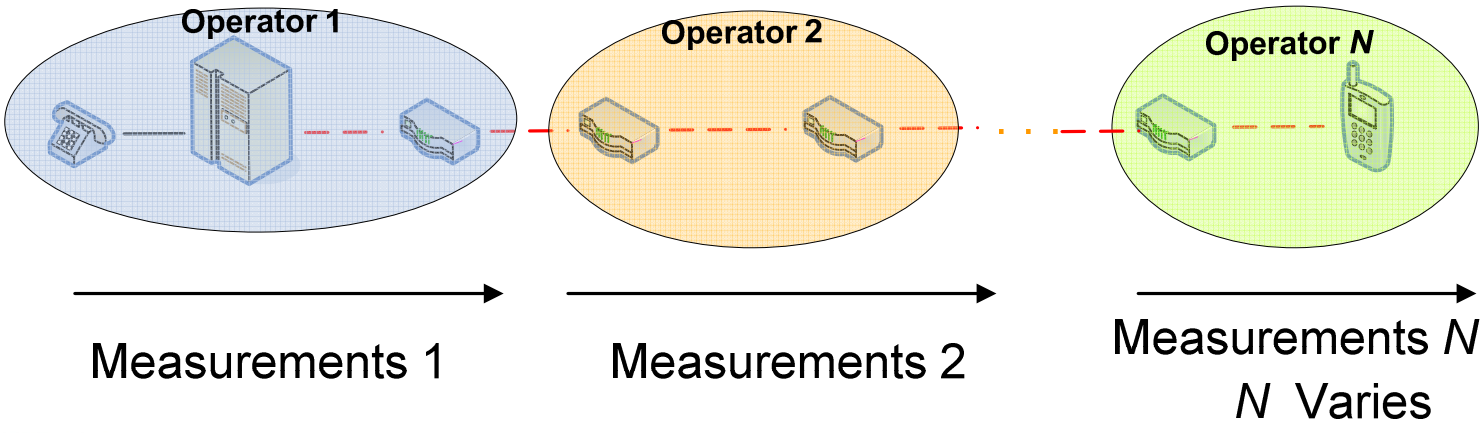
- Sonus Introduction
- QoS Problem statement
- Solution Overview
- i3Forum Action Items
- Case Study

What Do We Do at Sonus?

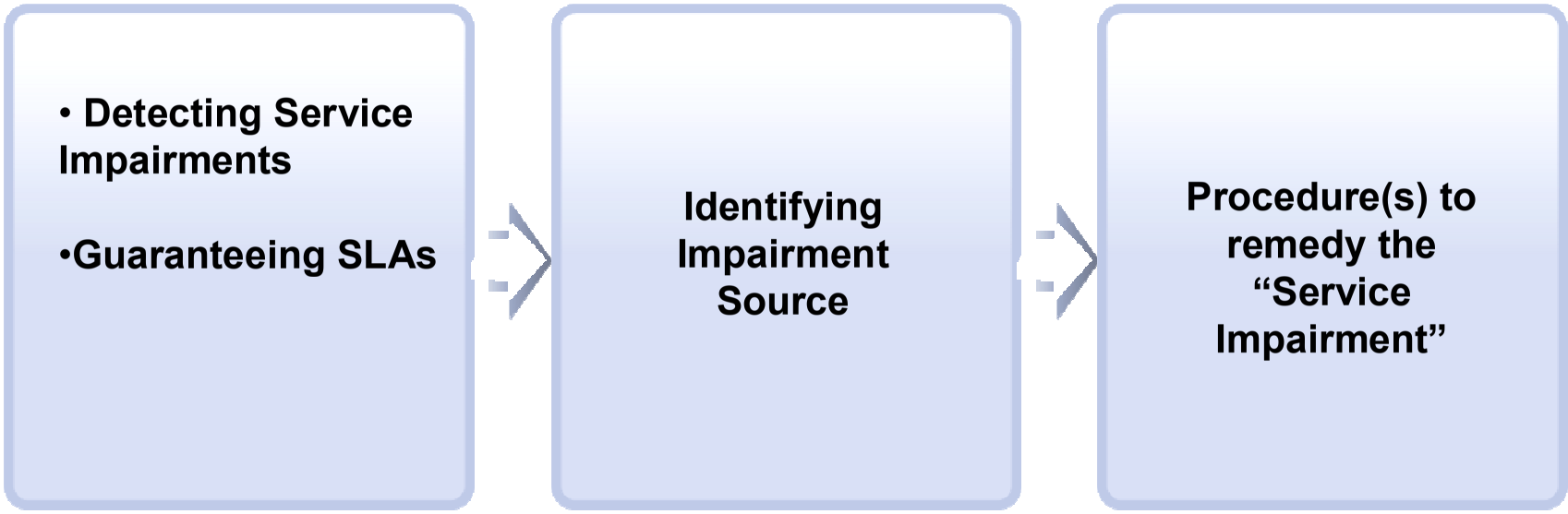


Problem Statement

- Guaranteeing QoS is challenging in IP networks.
- End to end path may go over many types of facilities, technologies, multiple network providers
- End to end performance is based on the aggregation of individual network segments
- The number of network segments in the path may vary request-by-request
- The impairment level of any given network segment is highly variable
- Difficult to pinpoint the source of impairments or the distribution of impairments between the networks across the path.



Solution Overview

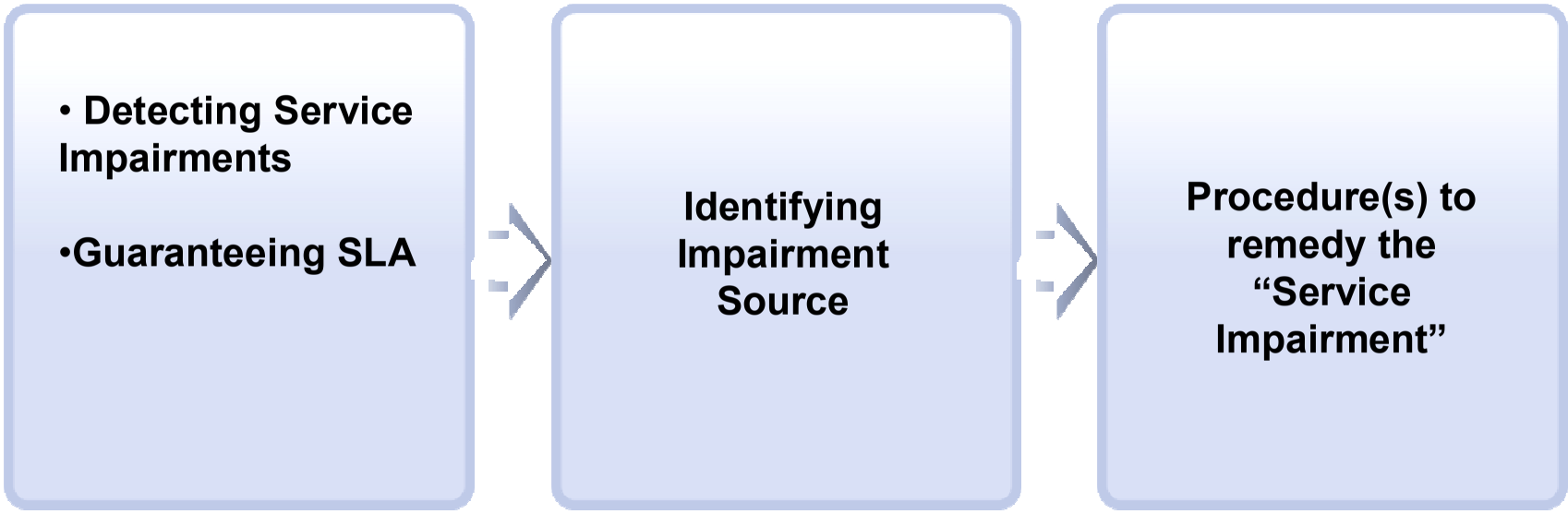


- Active Monitoring
- Passive Monitoring

- End-to-End RTCP Measurements
- Measurements in Network Border Functions

- QoS Aware Routing

Active/Passive Monitoring



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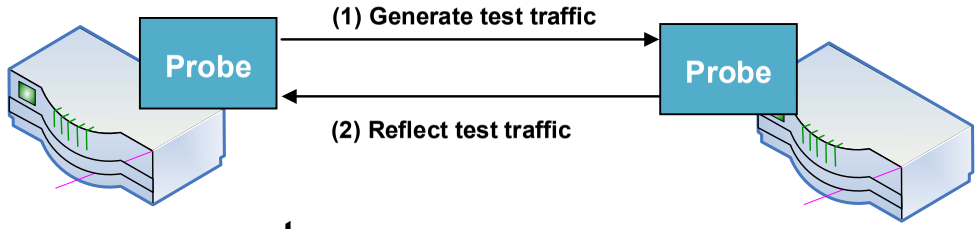
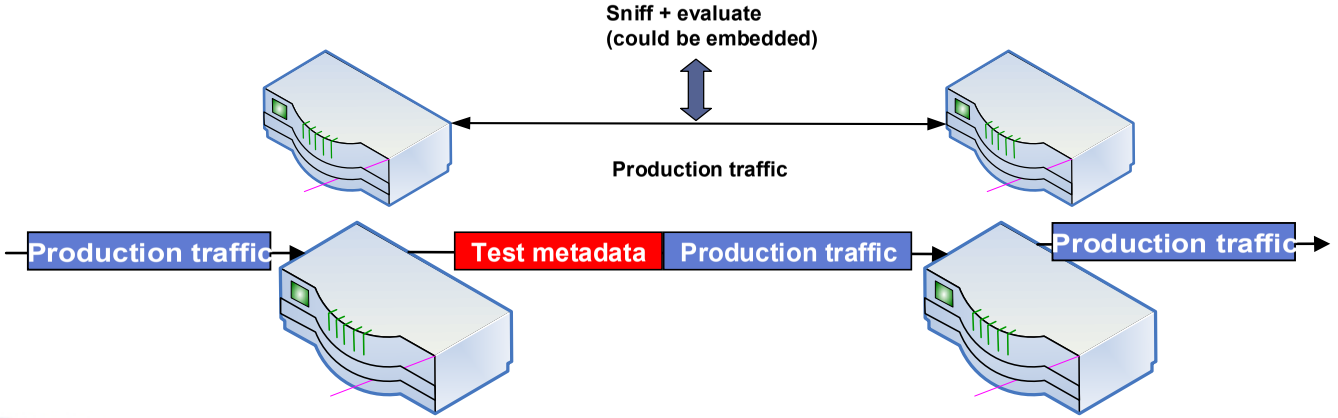
How to Measure?

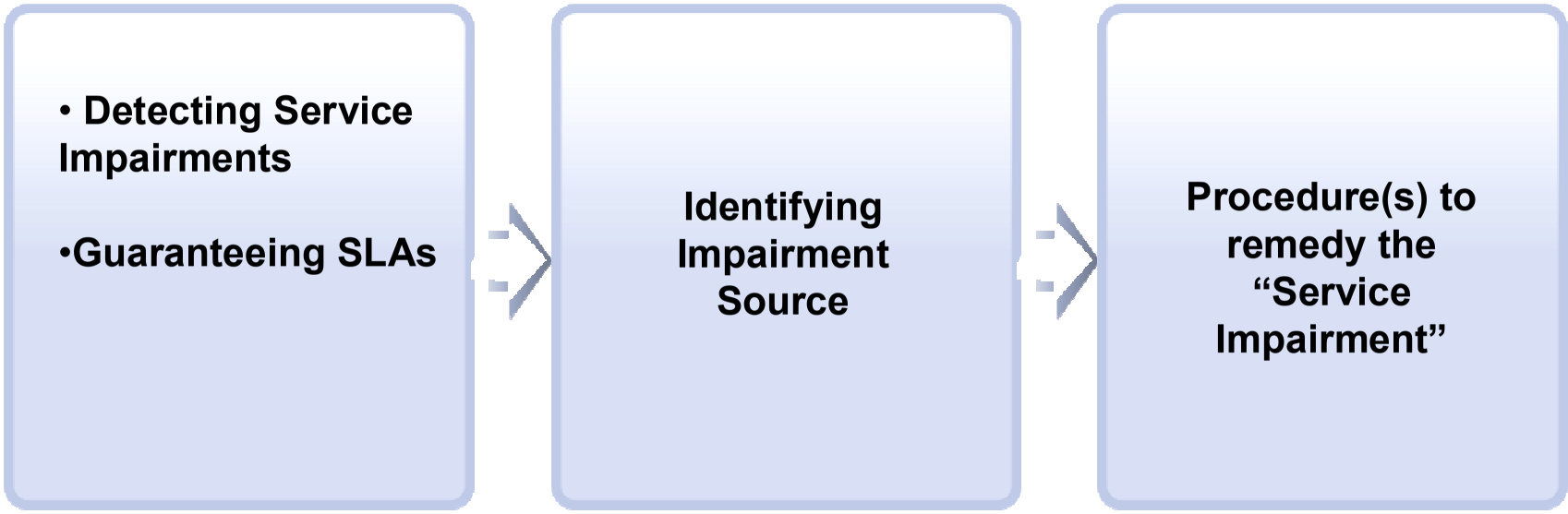
- Active measurements
  - Create synthetic test traffic.
  - Embedded or standalone probes.
  - Usefulness depends on how close the synthetic traffic is to real traffic.



- Passive measurements
  - Measure actual production traffic.
  - Can be less controversial (intrusion, privacy concerns).



End-to-End RTCP Measurements



- Active Monitoring
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- **End-to-End RTCP Measurements**
- Measurements in Network Border Functions

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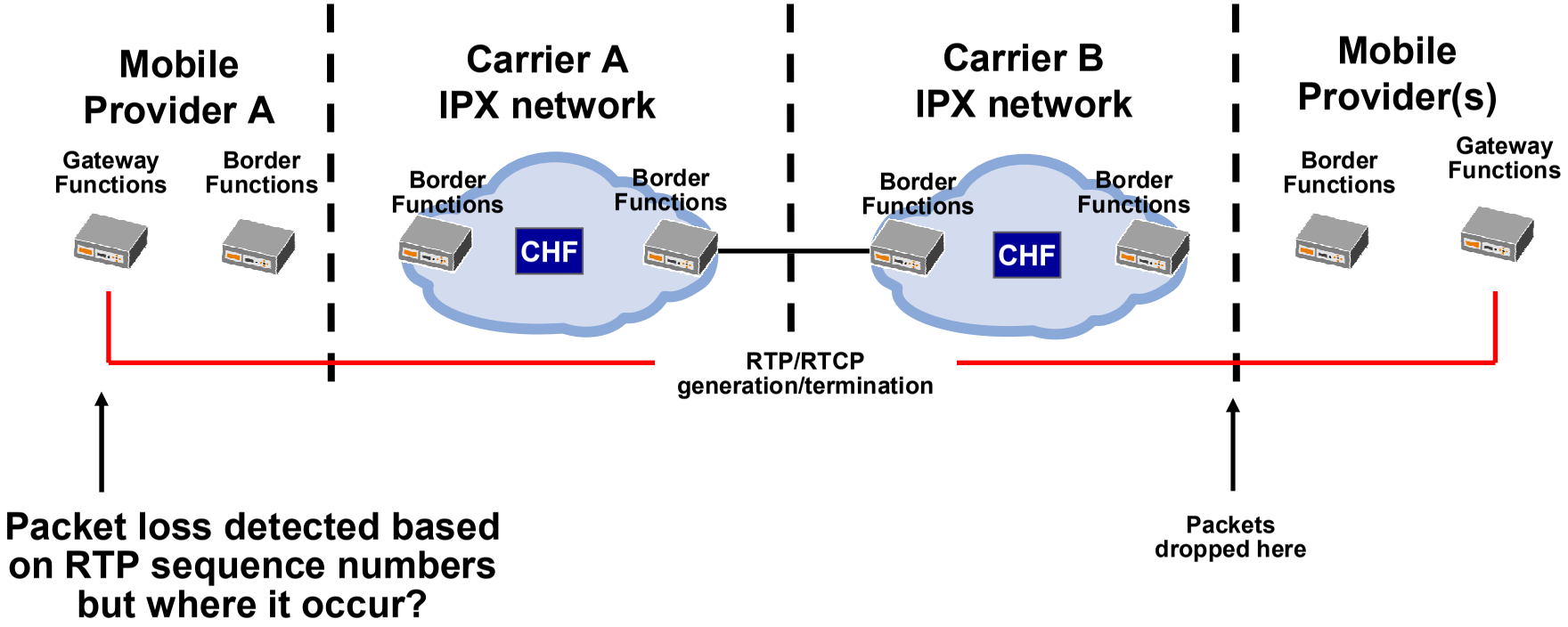
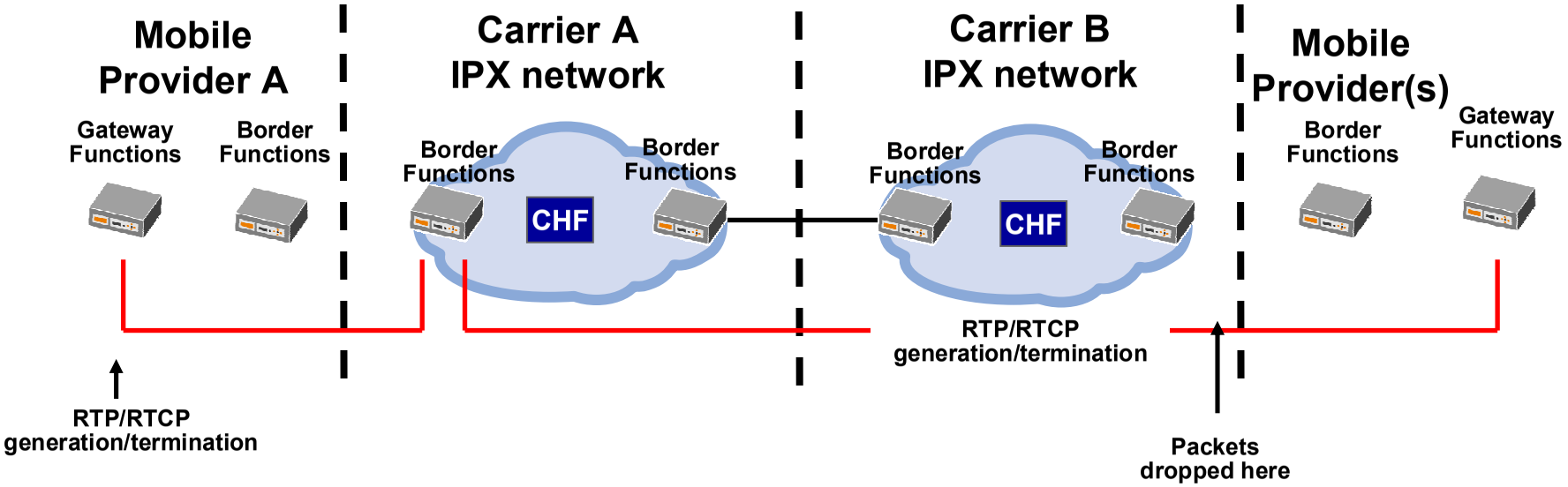
End to End RTCP

- Where is the actual problem?



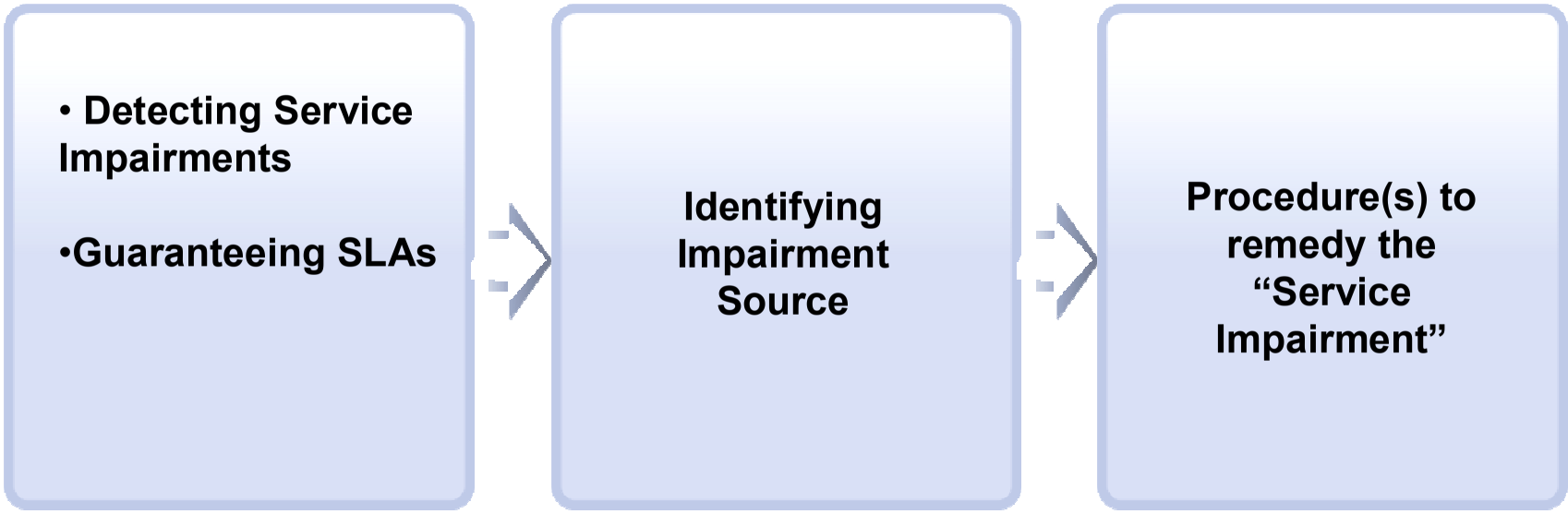
End-to-End RTCP Measurements

- Terminating RTCP will mask knowledge about packet loss.



- **Measurements do not indicate a problem because Carrier A Border Functions rewrite RTP sequence numbers shielding packet loss from Mobile Provider A**

Measurements in Network Border Functions



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- End-to-End RTCP Measurements
- **Measurements in Network Border Functions**

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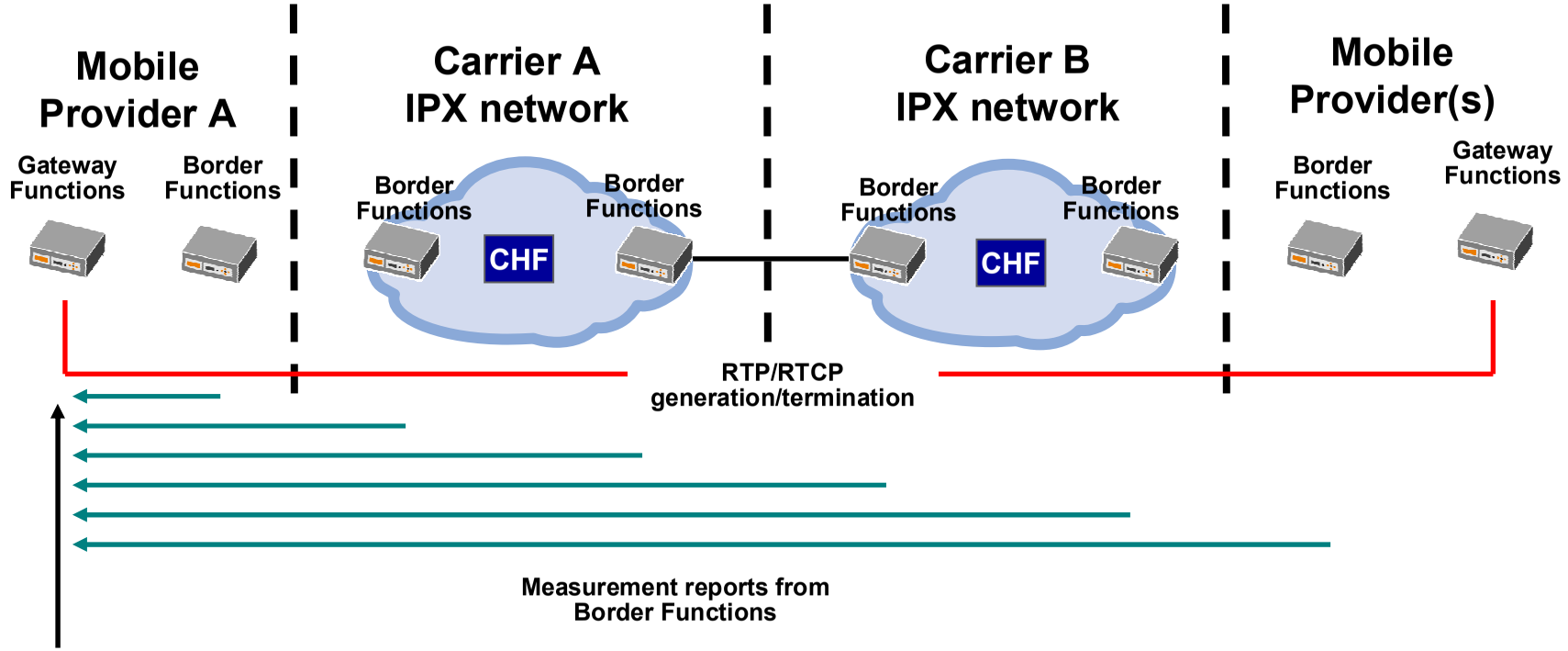
Measurements in Network Border Functions

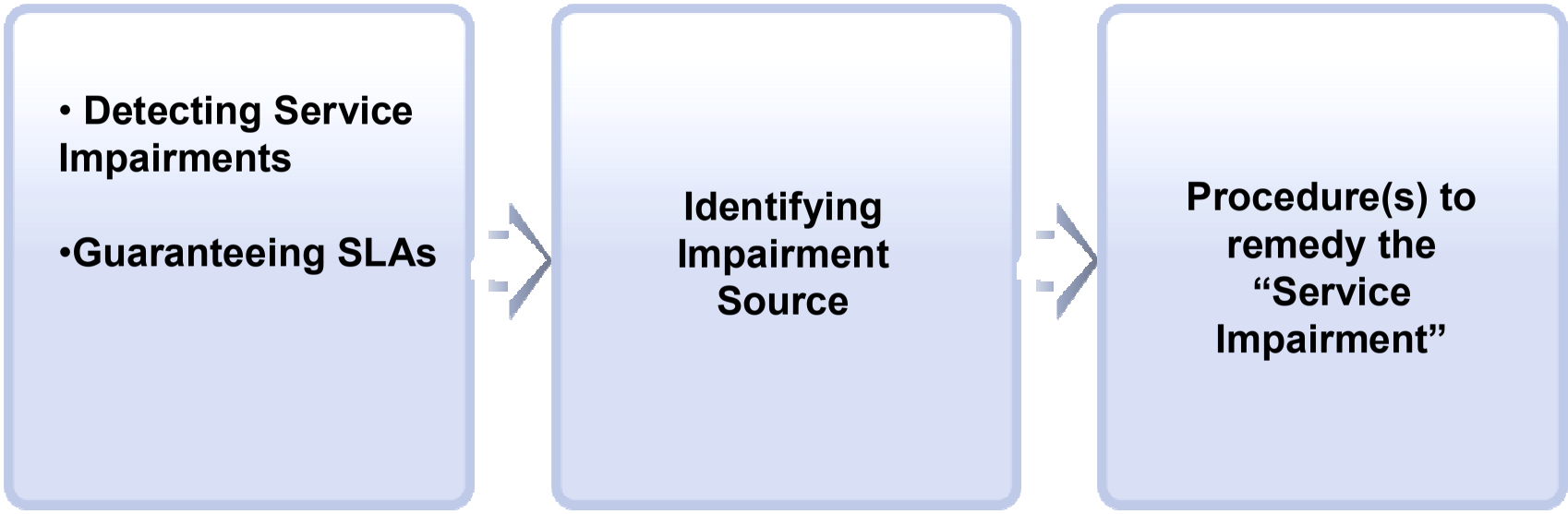
- Using Measurements in Border Functions to identify the problem location



Reporting Border Functions Measurements via SIP

- Works even if RTCP is broken
- Use SIP Signaling for reporting by each Border Function Element.
- Sent in the context of the call dialog
- Can be sent with PUBLISH or OPTIONS
- Message volume will be an issue – a mechanism needs to be identified to restrict the reporting to a configurable fraction of the total calls.

QoS Aware Routing



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i3Forum Action Items

- Decide how intermediary measurements are to be reported
  - RTCP piggybacking v.s. SIP method based reporting
  - For SIP method reporting, decide for PUBLISH v.s. OPTIONS
  - For SIP method reporting, use RFC6035 SIP Event Package for Voice Quality Reporting
- Decide whether a “generate reports” indicator is needed to control traffic volume
- Decide whether topology hiding is an issue for reports generated by Border Functions

Sonus Case Study

- Detecting Service Impairments
- Guaranteeing SLAs

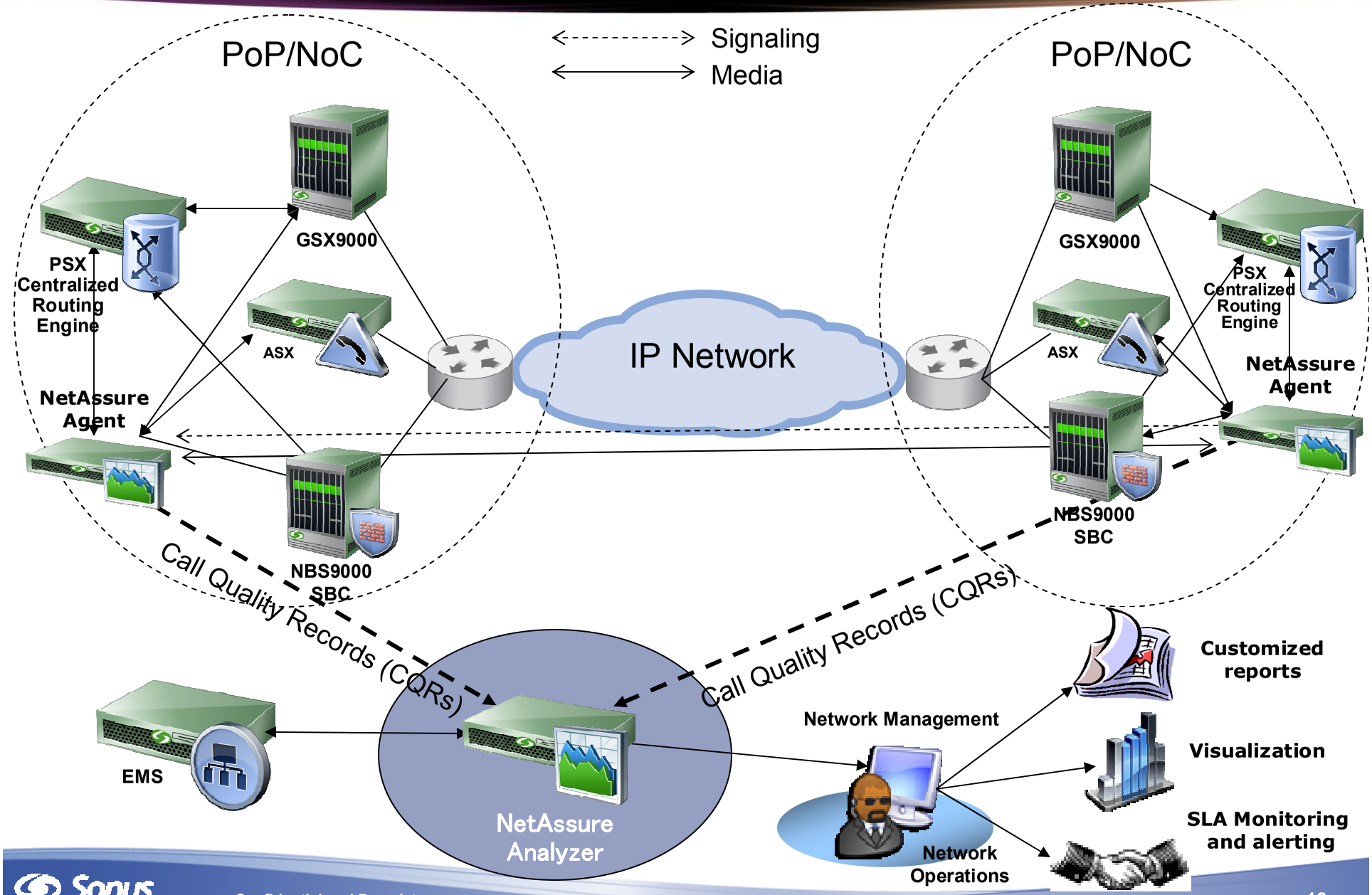
Identifying Impairment Source

Procedure(s) to remedy the "Service Impairment"

Sonus Case Study

- Experience in designing, deploying and troubleshooting the largest VoIP networks in the world.
- Built operational tools to support these networks
- Tools productized and made available to the entire Sonus customer base

Active Monitoring: Sonus NetAssure



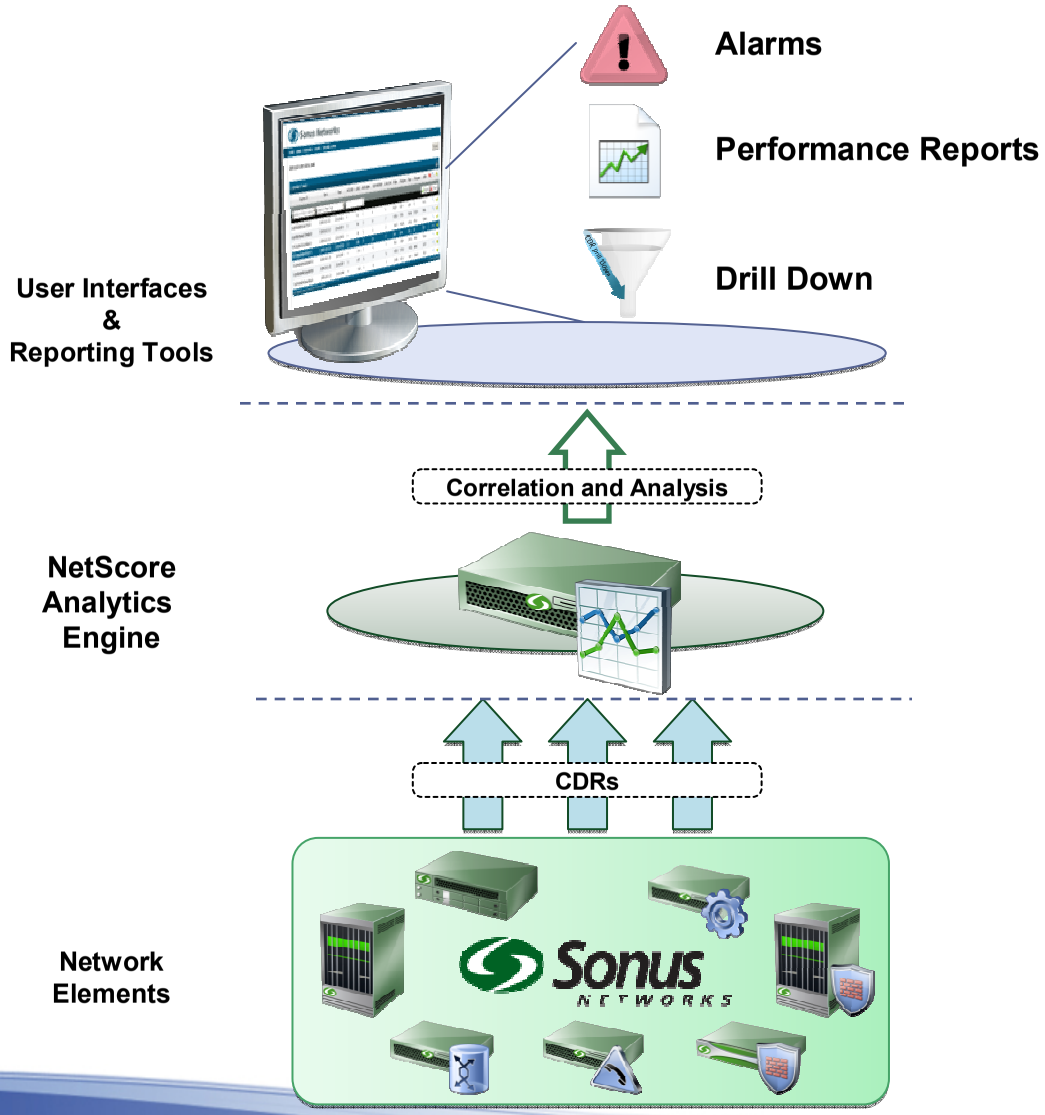
Lessons Learned from Active Monitoring (1)

- Need to monitor at different layers
  - Network layer – IP Switches, Routers
  - Service layers – Media Gateways, SBCs, Policy Engines
- Mimic the production traffic as much as possible
  - Synthetic centralized routing engine transactions, flexible generation of SIP messages and Call Flows, IP packets treatments in network elements
- In large networks, deploying a hardware-based monitoring solution may be prohibitive -> built a software based solution.

Lessons Learned from Active Monitoring

- Active monitoring suffers from the N^2 problem: Need to simplify provisioning and deployment of probing agents
- Need to have an intelligent mechanism to detect service disruptions, and to isolate faults
  - Dynamic Thresholding – learning about the network
  - Intelligent Systems to correlate events generated by various probes

Passive Monitoring: Sonus NetScore

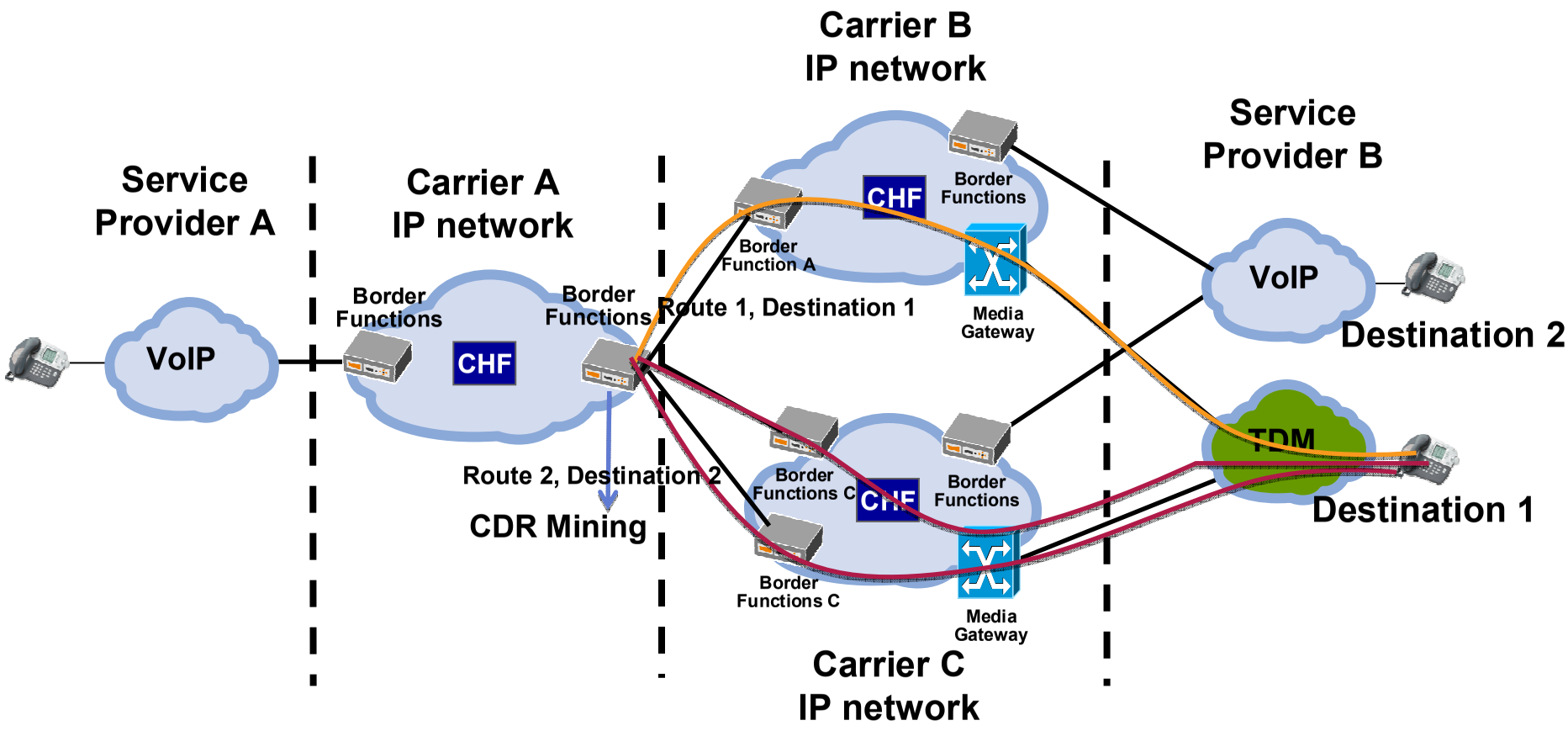


Lessons Learned from Passive Monitoring (1)

- Sonus's passive monitoring relies on mining the CDRs v/s full media capture and analysis – the latter approach may be deemed impractical /cost ineffective in large networks
- QoS metrics
  - Packet loss (1st and 2nd order statistics), jitter, Round Trip Time (when RTCP available or via probing)
  - Media impairments are typically indicative of a temporary problem rather than a chronic one.
- Service Parameters metrics
  - Answer Seizure Ratio (ASR) and Average Length of Conversation (ALOC) are typically indicative of service metrics.
  - Some carriers focus solely on the metric ALOC as an early indicator of service impairments of any type.

Lessons Learned from Passive Monitoring (2)

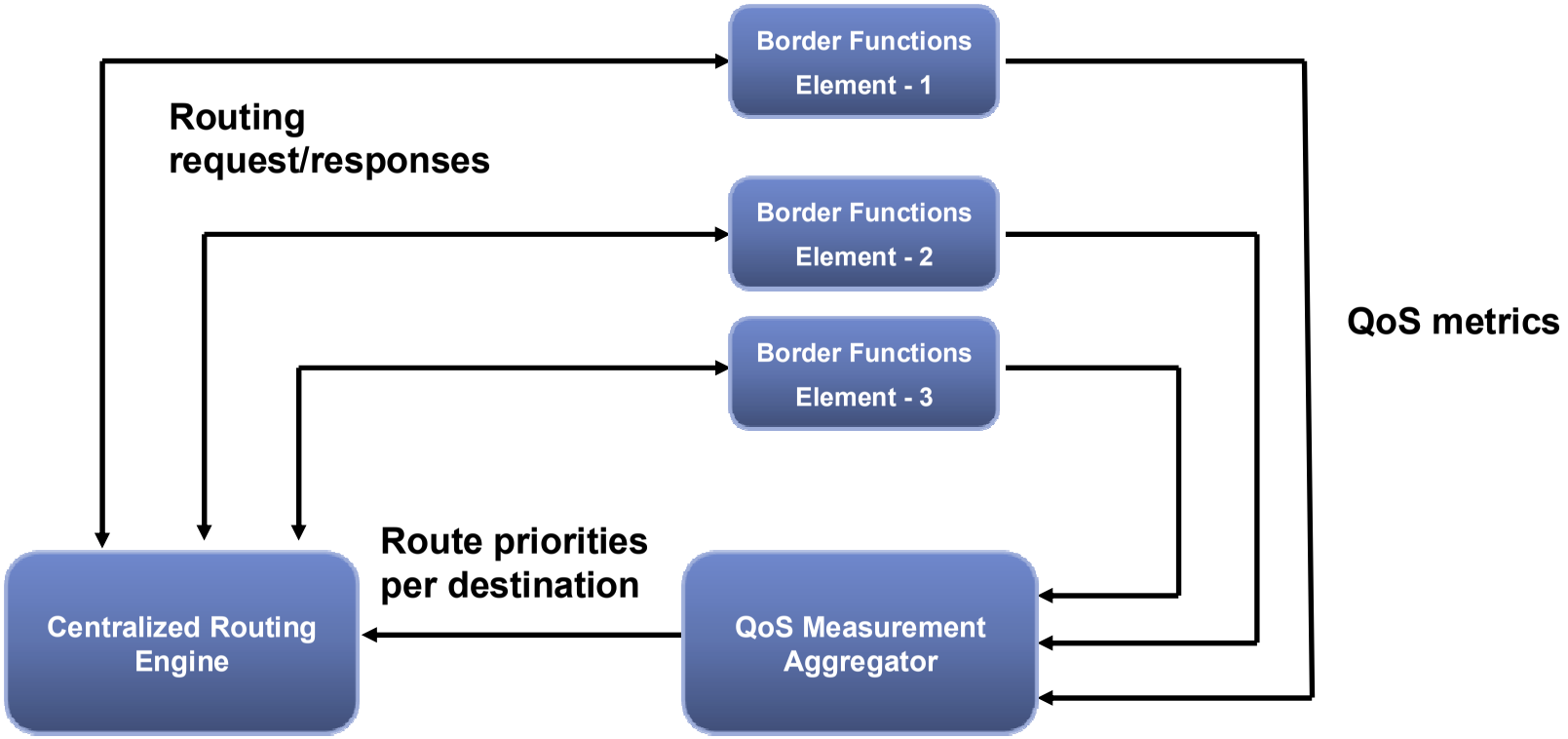
- Important to define the *Entities* (or combination thereof) for which the service metrics are calculated
- Individual *Entities* (when identifiable)
  - Adjacent BGF
  - Peering IPX
  - Service Provider
  - Destination – (Country Code, National Destination Code, etc..)
- A combination of *Entities*
  - Peering IPX AND Destination
  - Adjacent BGF AND Destination



Entity 1: Border C, Destination 1
Entity 2: Border A, Destination 1

QoS Aware Routing

- Measurements can be used for QoS Aware Routing
- More powerful if network wide QoS view is utilized



Thank You