HP Customer Experience Assurance V4.5

Deployment Guide

HP Customer Experience Assurance V4.5 is an OEM of the FlowSight application Release 4.5 from Zhilabs S.L. This document contains references to FlowSight which is identical to HP Customer Experience Assurance.

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1 OVERVIEW

This document aims at presenting the required guidelines needed in order to deploy *FlowSight* in an Operator's network. Also, it presents the rules to perform dimensioning of the system.

2 DEPLOYMENT

2.1 SERVER TYPES

FlowSight is a distributed architecture with three different server types as depicted in *Figure 1: FlowSight Server Types*:
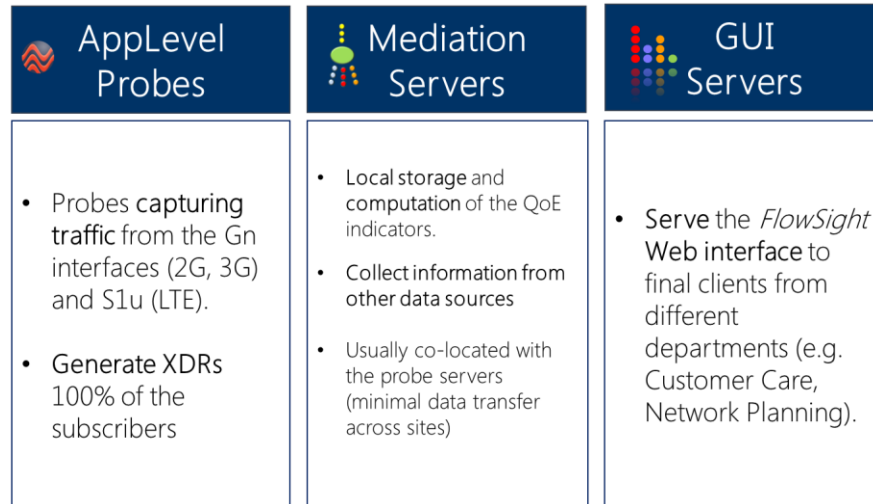
Figure 1: FlowSight Server Types

2.1.1 GN APPLEVEL PROBE

The probes capture traffic from the Gn interfaces. They generate XDRs which will be used for the generation of indicators and reports related to the QoE of the subscribers. 100% of the subscribers are monitored all the time.

2.1.2 MEDIATION SERVERS

These servers are responsible for providing local storage and computation of the QoE indicators. The mediation servers are usually collocated with the probe servers so that the data transfer across sites is minimized reducing transmission needs. These servers are also responsible for collecting information from other data sources (customer information, cell locations and names).

2.1.3 GUI SERVERS

These elements are responsible for serving the *FlowSigh*t Web interface to the final clients from different departments (e.g. Customer Care, Network Planning).

2.2 HARDWARE DESCRIPTION

Recommended HW for each type of server and the based for the dimensioning is the following one:

2.2.1 GN APPLEVEL PROBE

Model A **HP ProLiant DL380 G7** or **Gen8**, with the following technical requirements:	Model B **HP ProLiant DL580 G7**, with the following technical requirements:

• 2 CPUs 6-core, at the highest available clock speed.
• 96 GB RAM.
• 4 x 300GB 10K SAS disk (in RAID 0), for Operating System and data
• Monitoring network cards:
   o 4 x Dual-port 10GbE PCIe network cards, model **Intel® Ethernet Server Adapter X520-SR2**
• 2 x GE ports (in motherboard)
• Remote console card (HP iLO)
• Redundant power supply
	• 4 CPUs 8-core > 2.66 GHz
	• 256 GB RAM.
	• 4 x 450 GB 10K SAS disk (in RAID 0+1), for Operating System and data
	• Monitoring network cards:
	   o 4 x Dual-port 10GbE PCIe network cards, model **Intel® Ethernet Server Adapter X520-SR2**
	• 2 x GE ports (in motherboard)
	• Remote console card (HP iLO)
	• Redundant power supply

 Figure 2. HP ProLiant DL380 G7 Server *Figure 3. HP ProLiant DL380 Gen8 Server*	 *Figure 6. HP ProLiant DL580 G7 Server*

2.2.2   MEDIATION SERVERS AND GUI SERVERS

> **HP ProLiant DL380 G7** or **G8**, with the following technical requirements:
> - 2 CPUs Quad-core > 2.66 GHz
> - 128 GB RAM.
> - 2 x 450 GB 10K SAS disk (in RAID 1), for Operating System
> - 14 x 1.2 TB 10K SAS disk (in RAID 5), for data
> - 2 x GE ports (assumed in motherboard)
> - Remote console card (HP iLO)
> - Redundant AC power supply

2.3   SITE ARCHITECTURE

FlowSight tries not to move any data from the locations as traffic analysis data is massive and would stress the Operator's corporate network just to transfer the data to a centralized server.

Thanks to its distributed architecture, *FlowSight* keeps data local in every site next to the data source it comes form. As such, the architecture is fully distributed and every site has a similar structure.

2.3.1   TYPICAL *FLOWSIGHT* DEPLOYMENT

The preferred choice is a **distributed deployment for probes and mediation servers**. The reason under this preference is that servers located close to datasources reduce the bandwidth requirements and avoids huge data transfers.

FlowSight moves the collection and processing of the data close to the data source.

Thanks to its distributed architecture, *FlowSight* contains data local in every site, next to the data source it comes from. Every distributed site contains a number of *FlowSight* AppLevel probes and Mediation Servers.

On the other side, **GUI servers are usually located in a central site**. The GUI servers are used by different personnel to connect to the system through a web interface. The GUI servers will pick the relevant information from the distributed mediation servers when needed for internal processing and presentation proposes.

The following picture represents the typical *FlowSight* deployment architecture:
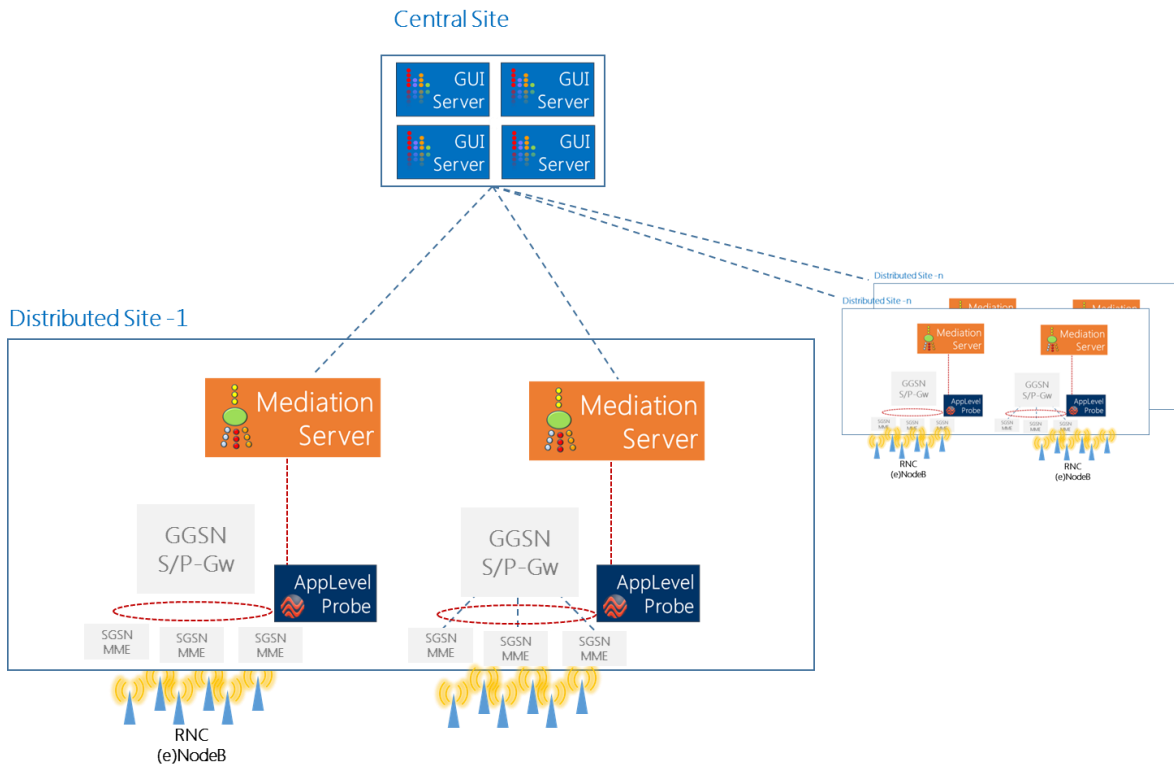

Figure 4: Typical FlowSight deployment architecture

2.3.2   ALTERNATIVE *FLOWSIGHT* DEPLOYMENTS

Although the preferred choice is a distributed deployment for probes and mediation servers and centralized GUI servers, this is not a must. Other approaches such as centralized architecture or a combined solution are feasible.

These alternative options could mean extra bandwidth requirements that should be taken into consideration.

2.3.3   HIGH-AVAILABILITY

High-Availability is not a requirement for *FlowSight* deployments. Nevertheless, its implementation will increase the complete availability of the solution although at the same time increases the total cost of the solution.

In order to decide whether to implement HA or not, the most important factor is related to the need of real-time processing: The more need of real-time processing, the more need of HA.

HA can be implemented in the three different layers of the system: probes, mediators and GUIs, and they can be implemented in an independent way, that is, it is possible to implement HA just

in probes and not in GUIs or mediators. The preference order to implement HA in the different layers is the following one:

1. **HA for probes**: Reduces the risk of data loose.
2. **HA for GUIs:** Increases the availability of the system from the end-user point of view. The perception of the user when the GUI is not available is that nothing is working in spite that the rest of the solution could be working properly, that is, the data may be collected and processed properly, but the user cannot see it.
3. **HA in mediation**: Reduces the risk of backlog.

Following paragraphs describe the recommended architecture configuration for HA in the different *FlowSight* nodes:

2.3.4 PROBE

We will need a 2 node cluster configuration with 1 floating IP for each probe. Heartbeat technology and any cluster management software can be used. Both Active/Passive and Active/Active configurations are possible. The mediators will collect data through the floating IP.

In case of failure of the active node the floating IP will change to the other node. In an active/passive configuration, the passive node will need to start the services and start to gather the data from that point; therefore some data can be lost during the switch. In the case of an active/active configuration, all data will be available, but it wouldn't have never been collected, so some purge method needs to be in place in order to not to duplicate data.
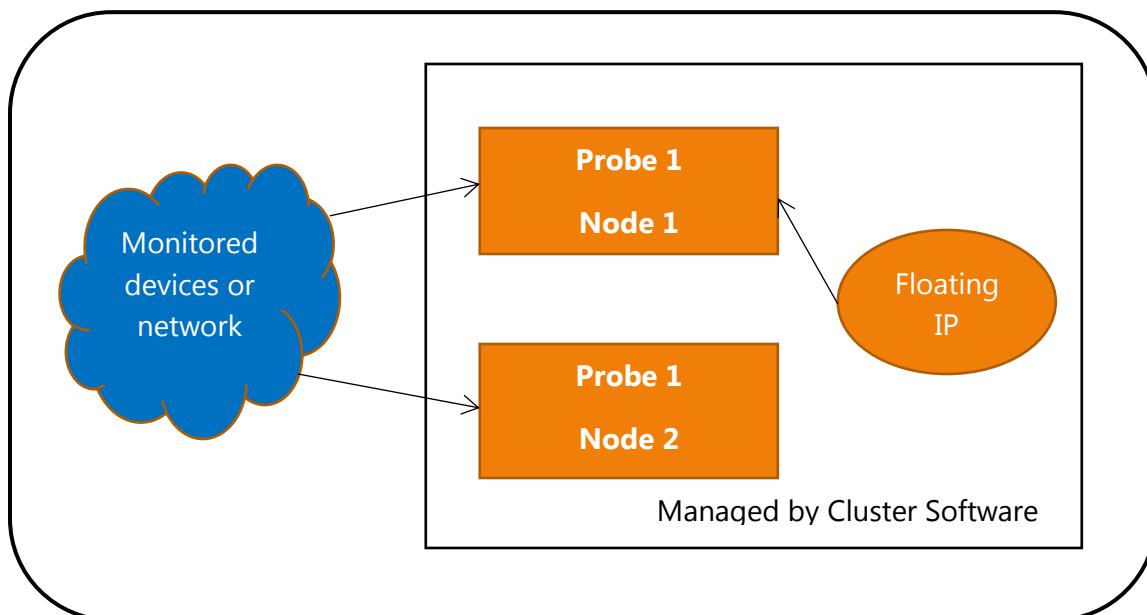

Figure 5. Probe cluster configuration.

2.3.5 MEDIATORS

We will need N mediator active nodes, each one to handle 1 to N probes traffic depending on data volume to handle, and 1 spare (passive) mediator node that will take care of the failed node. Heartbeat technology and any cluster management software can be used.

The mediators contain all the dataflows needed to process the data of each probe. In order to scale you just need to increase the number of probes and mediators. If the data volume of one probe is too high for one mediator, the traffic can be divided between more than one mediator, without dividing by application but by the traffic volume. (eg. Zones)

If one of the active mediator nodes fails, this will be detected by the cluster management software and it will start the failed mediator in the spare node. The strategy on how to pass the ztore and collected data to the spare node can vary: from mounting the same disk of the failed node into the spare node to syncing the data to some repository and syncing it back to the spare node when the failure occurs.
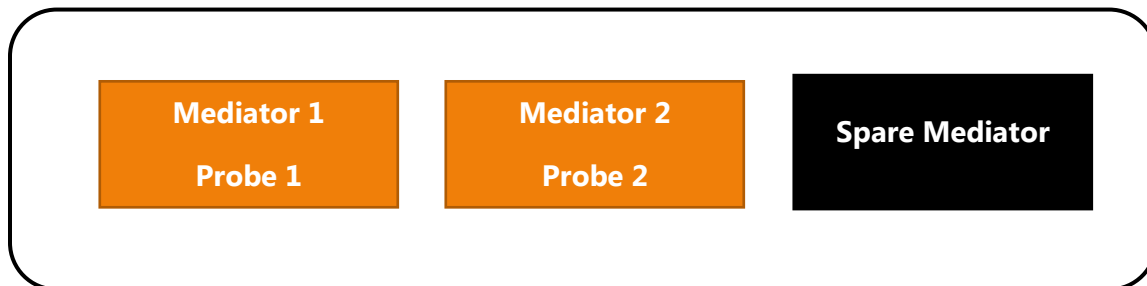

Figure 2. Mediator grid configuration.

2.3.6   GUI AND MASTER SERVERS

We will have at least 2 GUI nodes with a master server process running for each of them connected to the N mediators. The GUI nodes can be put behind a load balancer or similar device or strategy (eg. DNS round robin), in order to balance user traffic and to redirect users to the running GUI nodes if one of them fails. No cluster management software is needed.

The master server process will show to the GUI the aggregated information of the N mediator nodes to the GUI.

As both nodes are active, if one of them fails, the other one will automatically take over all the traffic from the failed one.
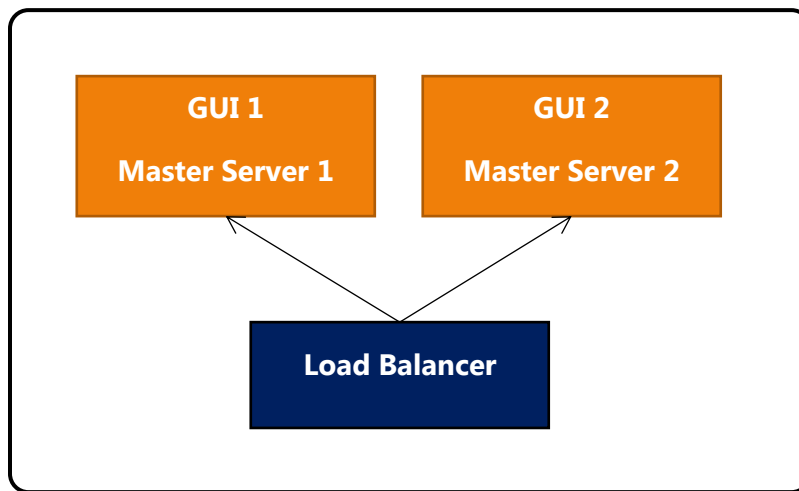

Figure 3. GUI and Master Server configuration.
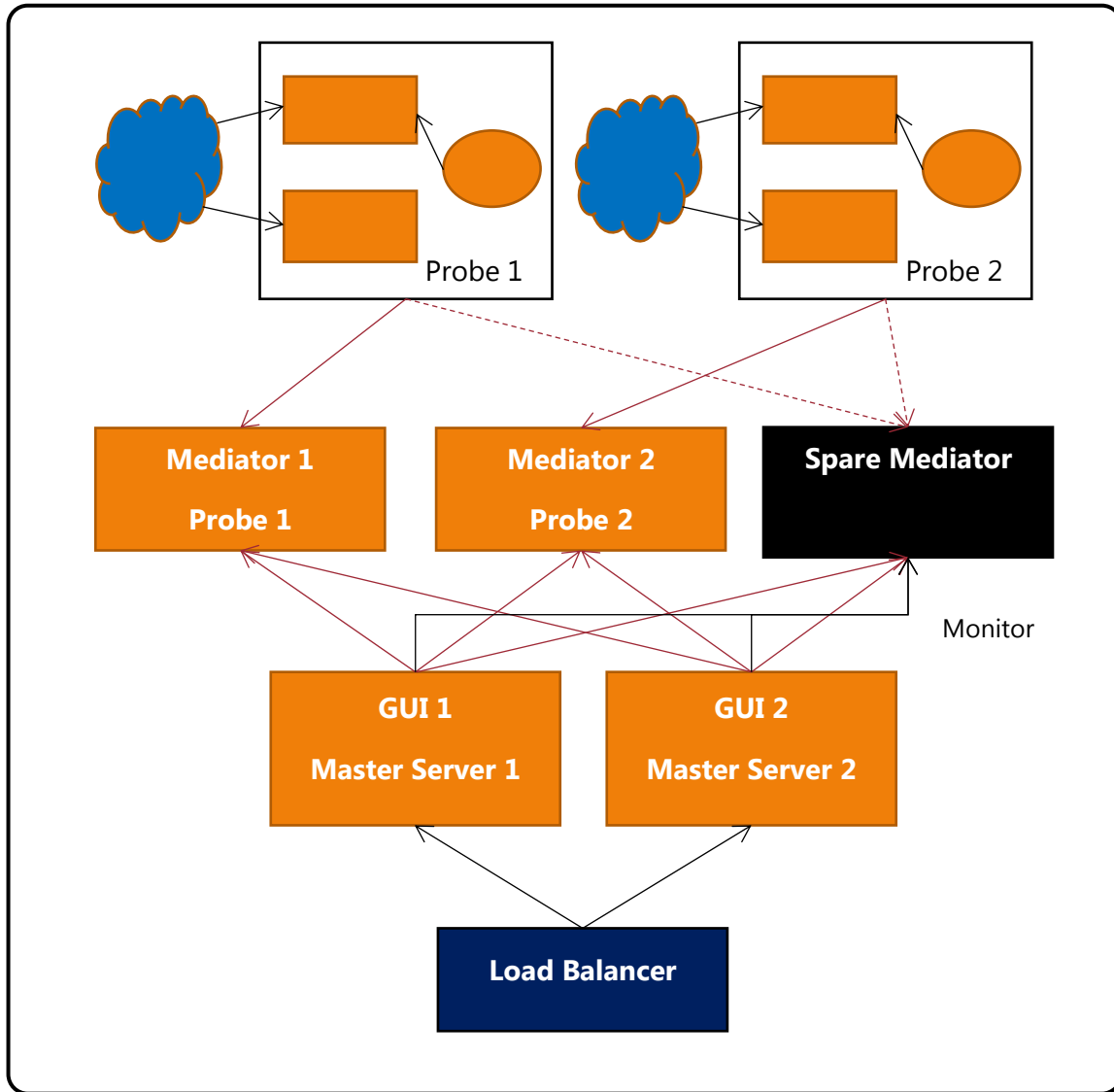
2.3.7   FULL ARCHITECTURE

Figure 4. Full Architecture.

3 DIMENSIONING GUIDELINES

Dimensioning is a complex task due to the different factors contributing to capacity needs: throughput in Busy Hour, number of reports, available dimensions, and different datasources and alike.

In order to make this task simpler and offer a clear guideline, some simplifications and assumptions have been done:

⚠️	This guide considers **FlowSight 4.5 MBBQoE package** This guide uses just one single main criterion for probes and mediation servers: **throughput in Busy Hour.** For the GUI servers, another single criterion is used: **the number of concurrent users.** Additionally, for *FlowSight* solutions including additional reports, it provides an alternative dimensioning of mediation servers based on the **number of events and effective reports**.

3.1 DIMENSIONING PROBES

A probe should be deployed by GGSN or 10Gbps maximum, whichever is first. Consequently, there will be as many probes as GGSNs or 10Gbps links

For Gn interfaces handling traffic up to 3Gbps Probe **Model A** is suggested otherwise **Model B**.

3.2 DIMENSIONING MEDIATION SERVERS

3.2.1 PER INPUT TRAFFIC

The number of mediation servers depends on the number of Gn probes and the traffic they handle. The rules are as follows:

1.   If the traffic handled by a probe is less than 3Gbps, one mediation server is required.
2.   Otherwise, two mediation servers are required per probe.

Gn Mediation servers are strongly recommended to be installed on the same site and connected through the same local network that the Gn Probes are, as the volume of data is really high among them.

3.2.2 PER NUMBER OF EVENTS

For deployments of *FlowSight* that considers additional reports (not limited to MBBQoE), we provide simple guidelines to do sizing, by means of using two parameters:

- *XDRs per day*
- *Number of Effective Reports*

Effective Reports: We use this concept to emphasise that not only the number of reports but also the number of dimensions must be taken into account in order to make a dimensioning of the mediation servers.

In order to calculate the effective number of reports, you will need to list the reports and the dimensions they are available for. It is very useful to use a table such as *Table 1: Effective Reports Calculation*.

KPI/Dimension	dim1	dim2/dim3	dim4/dime5/dim6	dim1/dim3	dim7/dim8	dim9	dim10	dim1/dim8/dim10/dim3	dim11	effective reports	effective reports	effective reports	effective reports	effective reports	effective reports	effective reports	effective reports	effective reports
KPI A	X	X	X				X	X	X	1	2	3	0	0	0	1	4	1
KPI B	X		X		X		X	X	X	1	0	3	0	2	0	1	4	1
KPI C	X	X	X	X		X	X		X	1	2	3	2	0	1	1	0	1
KPI D	X	X			X	X		X	X	1	2	0	2	2	0	0	4	1
KPI E	X		X	X		X	X	X	X	1	0	3	2	0	1	1	4	1
KPI F	X	X			X	X	X	X	X	1	2	0	2	2	0	1	4	1
KPI G	X	X	X	X		X	X	X	X	1	2	3	2	0	1	1	4	1
Total Effective Reports																		**88**

Table 1: Effective Reports Calculation

Based on the Zhilabs experience in different deployments and considering:

- the daily XDRs and
- number of total effective Reports

The number of Mediation Server needed can be calculated considering the following formula:

$$\#Mediation\ Servers = ROUND\_UP(\ \mathbf{1,66} * \mathbf{10^{-6}} * Total\ Eff\ Reports * Million\ XDRs\ per\ day)$$

3.2.3   DATA RETENTION

Previous dimensioning has been done considering the following default data retention values:

- 3 months for XDRs
- 2 years for Processed Data.

3.3   DIMENSIONING GUI SERVERS

Each GUI server has capacity for 20 concurrent users.

4 CONNECTIVITY

4.1 IP CONNECTIVITY AND FIREWALL CONFIGURATION

Three IPs per server are needed:

- Corporative Network
- O&M
- iLO

Firewall configuration details are described in following table:

Server Type	Port	Remarks
Gn probe – Mediation Servers	22/TCP 161,162/UDP	SFTP/SSH to collect traces
GUI Server – Mediation Servers	1974/TCP 22/TCP 161,162/UDP	Distributed queries File collection Traps/alarms
Client Machines – GUI Servers	80, 8080/TCP	Web GUI connectivity

4.2 BANDWIDTH REQUIREMENTS

- Bandwidth requirement between the Mediation Servers to each GUI Server is 20Mbps.
- Gn Probe and Gn Mediation Server must be in the same network segment with at least 1Gbps switch connectivity.

4.3 CONNECTIVITY OF APPLEVEL PROBES

4.3.1 OPTICAL INTERFACES

Due to the fact that the upstream and downstream traffic related to each session can be on any of the 2 links of a GGSN, a single probe for GGSN has to be used.

The Figure 6 below shows the physical connectivity (at link level) between the links of a GGSN and the corresponding AppLevel Gn probe server: there will be a passive optical splitter per link.
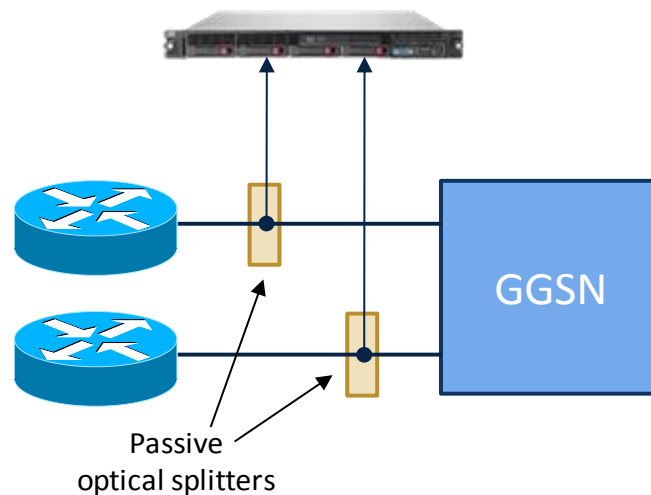

Figure 6.Example physical connectivity between the physical links of a GGSN and AppLevel probe.

The next figure shows the same, but now drilling down to the fiber, card and port level (since there are 2 optical fibers per 10GbE link).
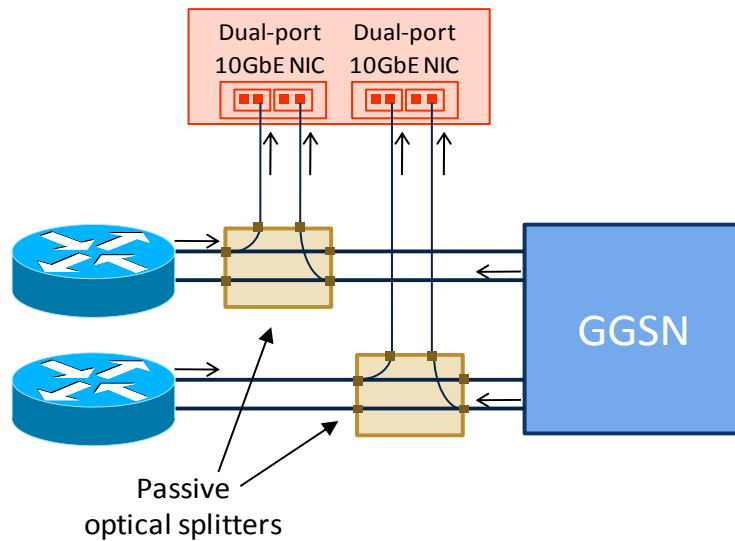
Figure 7.Physical connectivity at fiber, card and port level.

4.3.2 OPTICAL SPLITTERS

Regarding the optical splitters, the suggested model is the TP-SR2-SCSLM from NetOptics, since it is passive (so that there is no risk of service outage due to some power-related problem), with a split ratio of 80/20 and with a format to be positioned inside the ODF. These are the corresponding features:

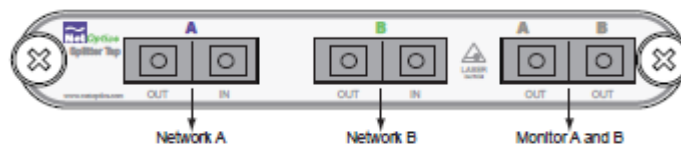**TP-SR2-SCSLM:** Slim Tap, Fiber, 10G, SR 62.5µm, SC, 850nm, 80:20 split ratio.

Figure 8.Connection diagram of the passive optical splitter.

4.3.3 PORT MIRRORING

Figure 9 below shows the physical connectivity between the switches to which a GGSN is connected and the corresponding AppLevel probe server, with port mirroring (SPAN) per link.
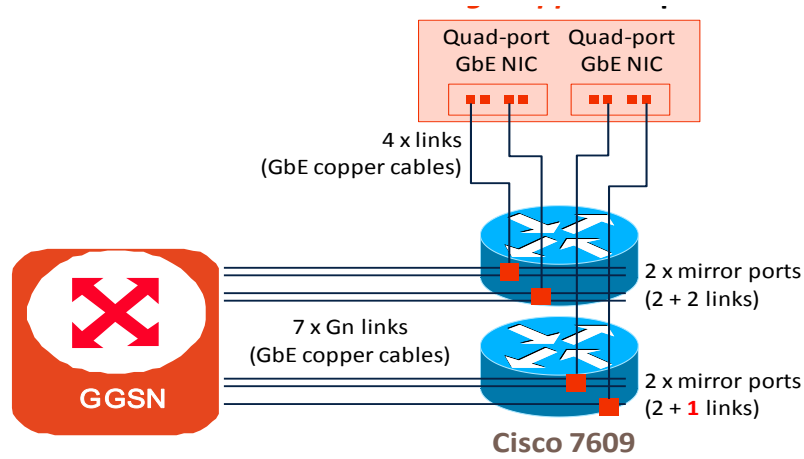
Figure 9.Physical connectivity of AppLevel probe via port mirroring.

5 EXAMPLE: OPERATOR #1

5.1 NETWORK DESCRIPTION

The table below summarizes the GGSNs in this network.

Domain	NETWORK NODE	NUMBER	BH Throughput [Mbps]
2G/3G			
SITE1	GGSN	2	5
SITE2	GGSN	3	6

Whereas the following table depicts the estimations for the end of 2013

Period BH Throughput [Mbps]	Q2013 11 Gbps

5.2 DEPLOYMENT & DIMENSIONING

SITES	CENTRAL SITE		SITE1	SITE2
Central				
Total Number of AppLevel Probes	5		2	3
Total Number of Mediation Servers	4		2	2
Total Number of GUI Servers	1	1		
TOTAL	10	1	5	5

Sizing	Gn Probe Servers	Mediator Servers	GUI Servers
Central Location	0	0	1
Site 1	2	2	0
Site 2	3	2	0
TOTAL	5	4	1
TOTAL SERVERS		10	

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