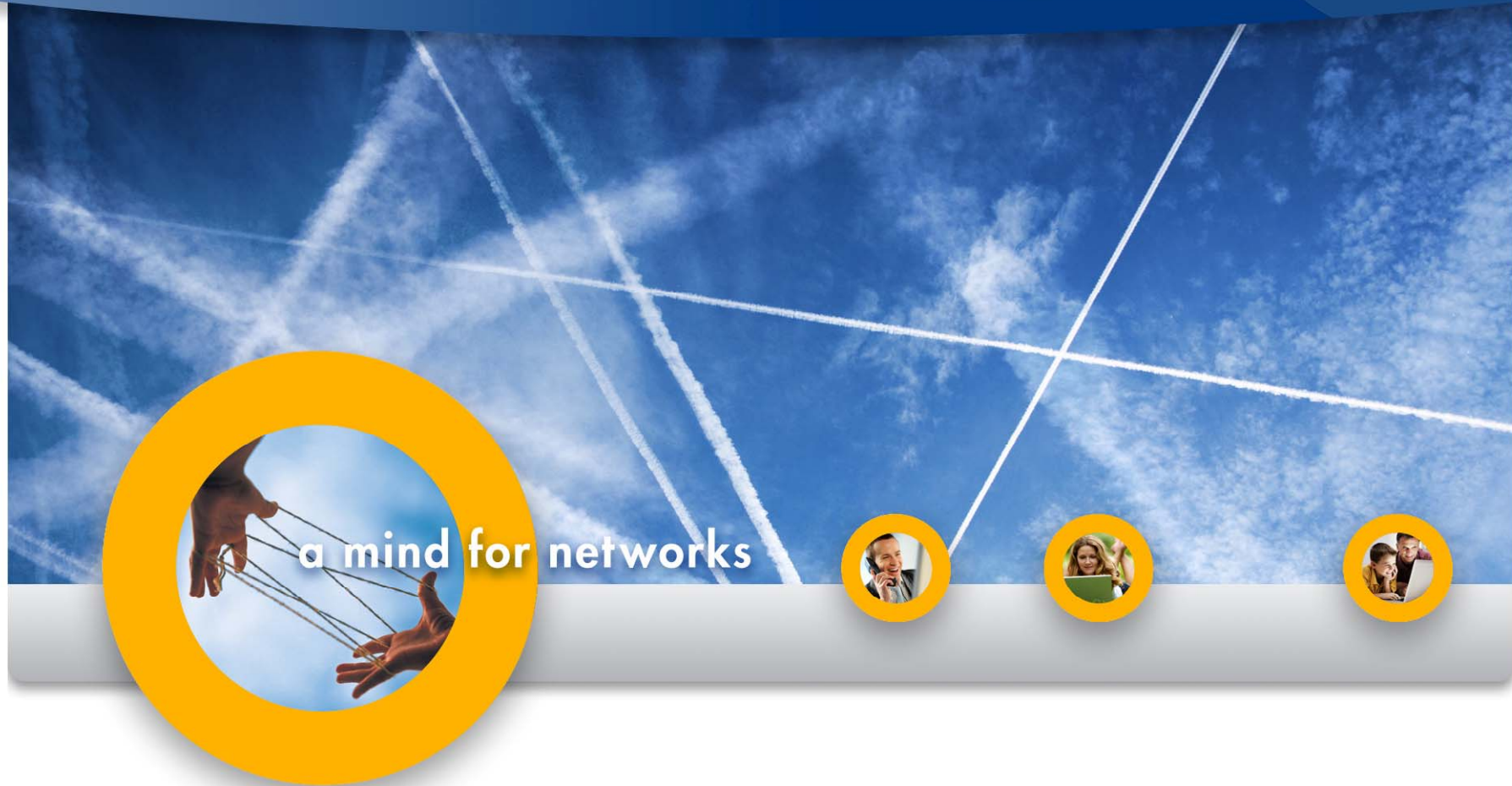


# Traffic Steering



## Traffic Steering

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# Integrated Services - Agenda

## ● Concepts

### ● 4 Service Scenarios

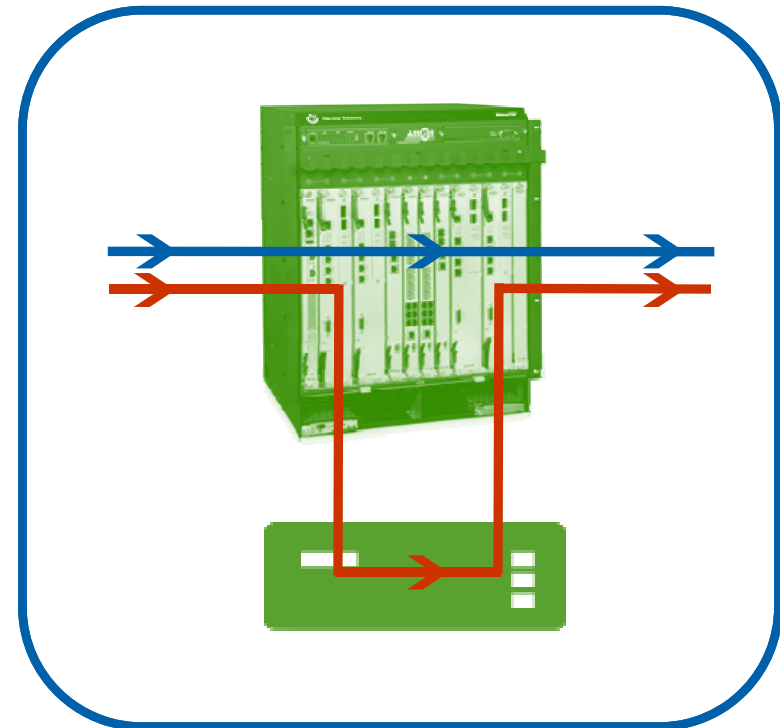
- Internal Redirection (MS)
- Internal Port Based Mirroring (SP)
- External Redirection
- External Mirroring (Policy Based)

### ● Load balancing and Service Availability

### ● Service Chains

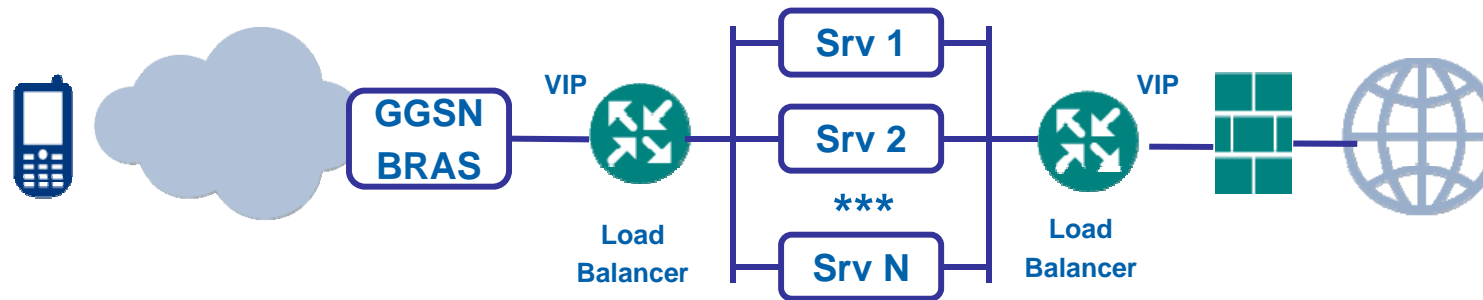
### ● SFC Port Usage

### ● Graphs

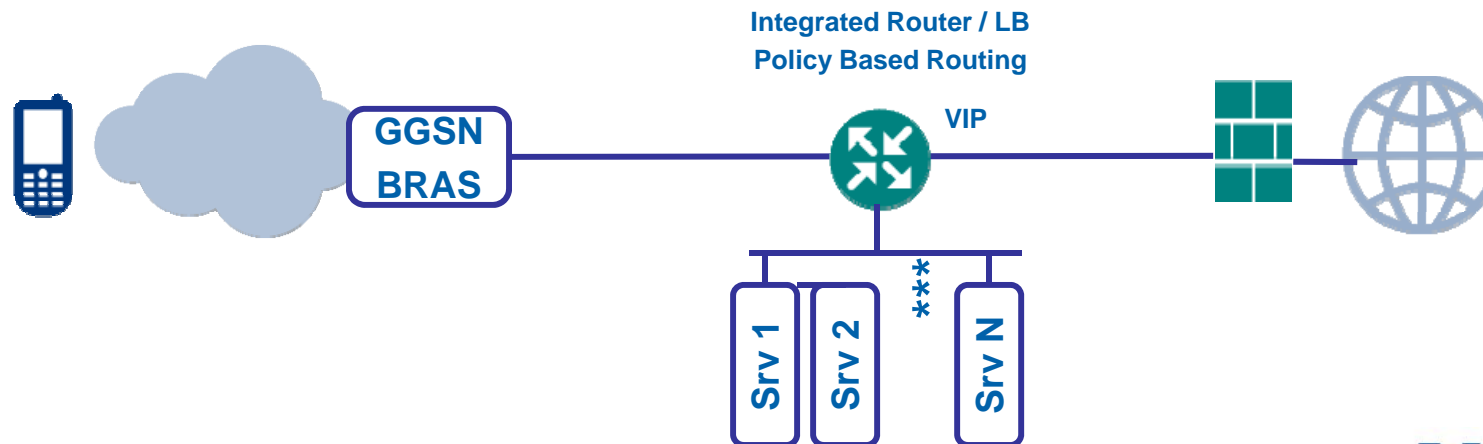


# What is the problem we're addressing....

## Typical VAS Deployment (No DPI) – In Line



## Typical VAS Deployment – (One-Arm) / Two-Arms



# Value Proposition

- **Intelligent steering based on traffic characteristics**
  - Traffic flows to and from external server clusters or internal service blades
  - Load balancing among service blades/servers
- **Complete Service configuration management including monitoring and alerting**
- **High service availability including service monitoring and action on failure**
- **Less boxes / Failing parts in the network**
- **Optimization of the service cluster size.**



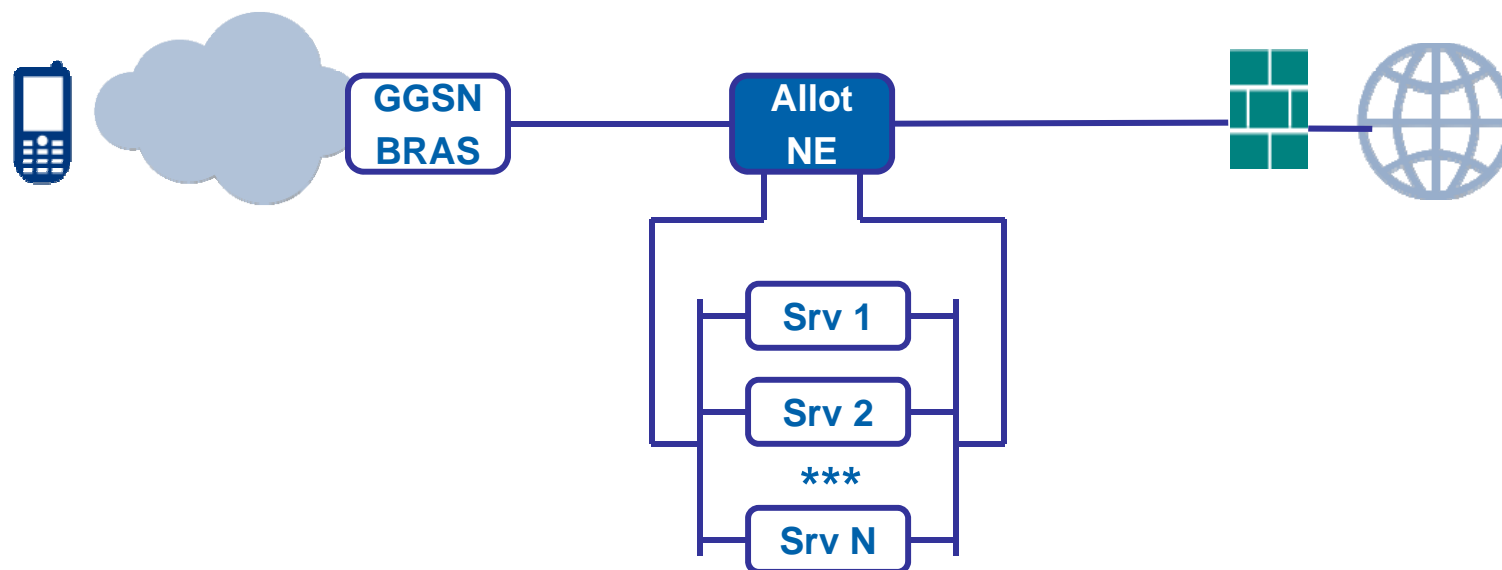
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# Services and Servers

- **Each Service Gateway can provide up to 16 Services**
- **Each Service is made up of one or multiple servers**
  - Up to 26 Servers per service
  - Up to 256 Servers per Gateway

# What we are proposing

## Allot's proposed Steering Architecture



# Transparency / Proxy

- **Transparency :**

- a VAS server is transparent at Layer n when the traffic flowing to it does not modify its Layer n source address.
- L3 Non-transparent services typically act as CS-NAT (Client Source NAT), i.e. Replace the client IP address (usually private) with a public pool

- **Proxy :**

- A VAS server acts as proxy when it establishes a dedicated TCP connection with each end (i.e. One TCP connection to the subscriber, one connection to the internet server for example)

AOS Steering solution works with fully-transparent and transparent-proxy VAS.  
Non Transparent (e.g. NATed) is not supported



# Concepts: Types of Services

Services may be any of the following...

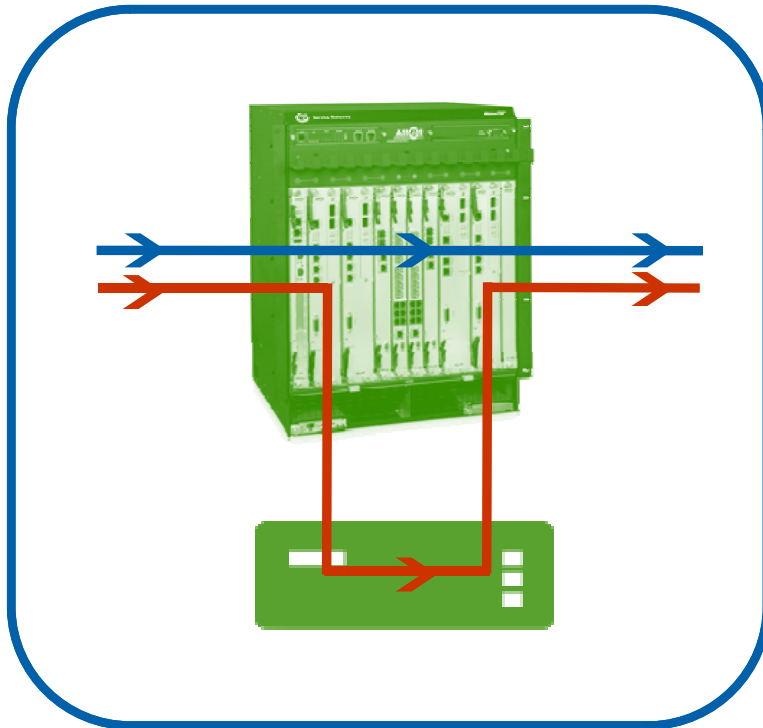
- Network or Subscriber
- Internal or External
- Allot or 3<sup>rd</sup> Party



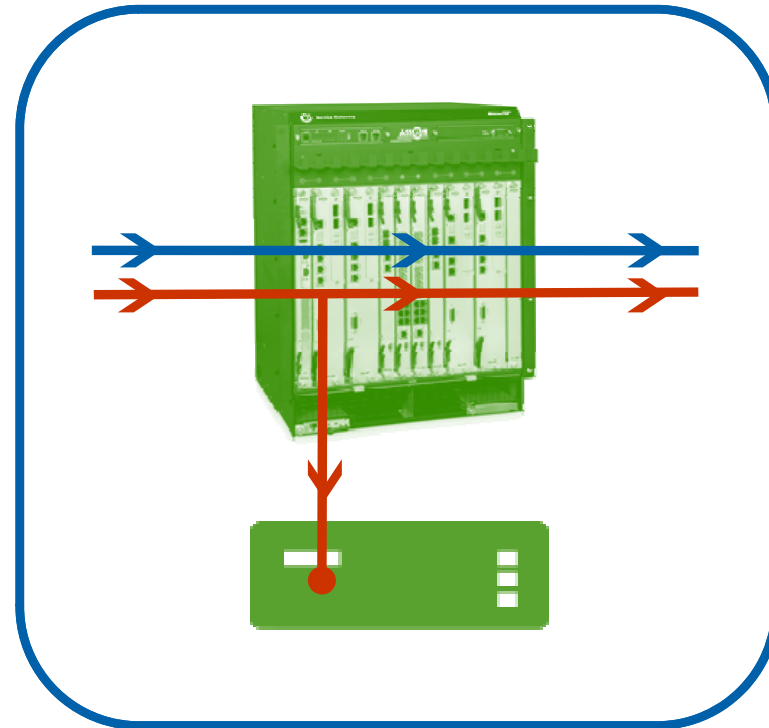
**NSS = Network and Subscriber Services**

# Concepts: Types of Steering

Traffic Steering may be any of the following...



*Policy Based Redirection*



*Policy Based Mirroring*



Application/Subscriber A

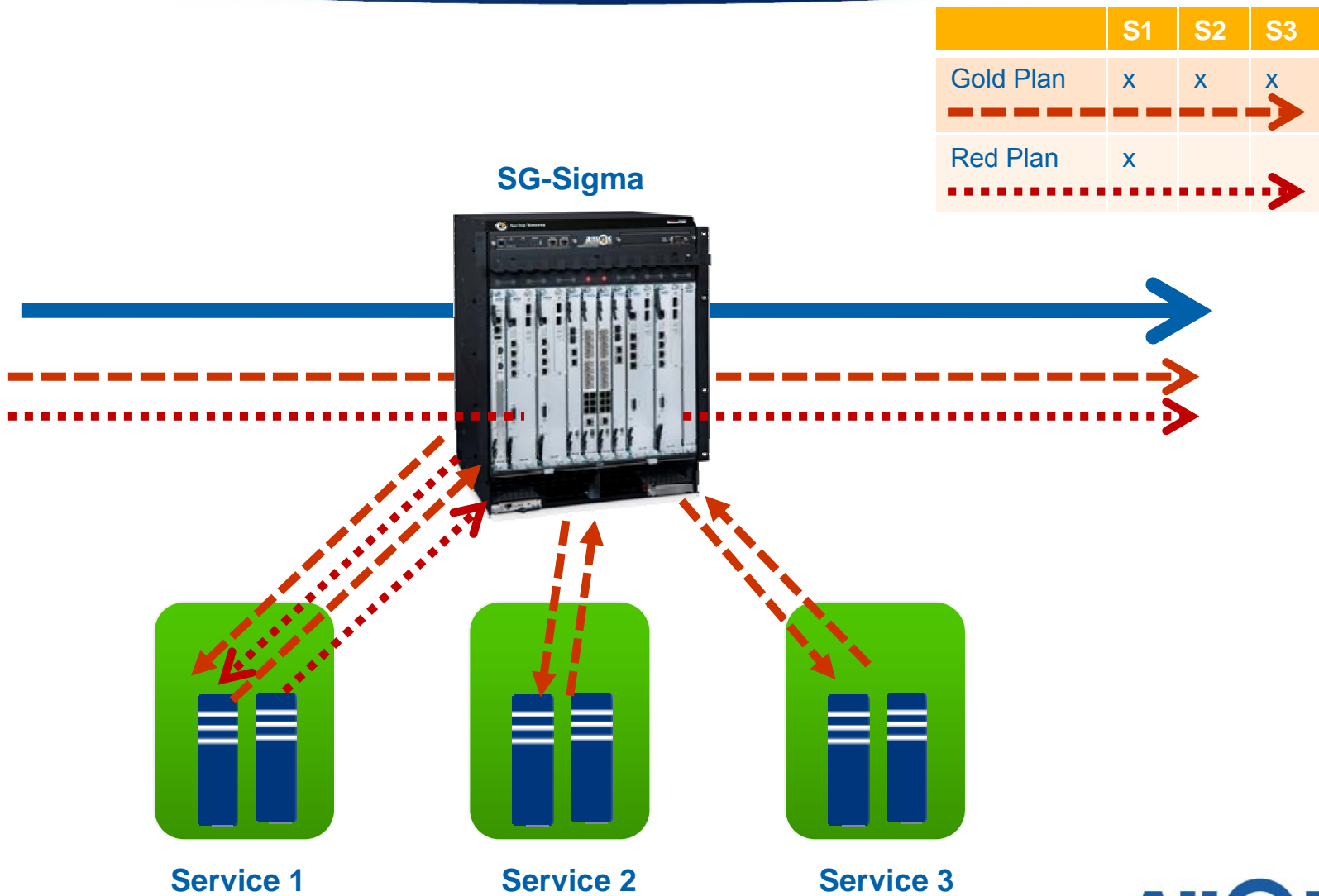


Application/Subscriber B



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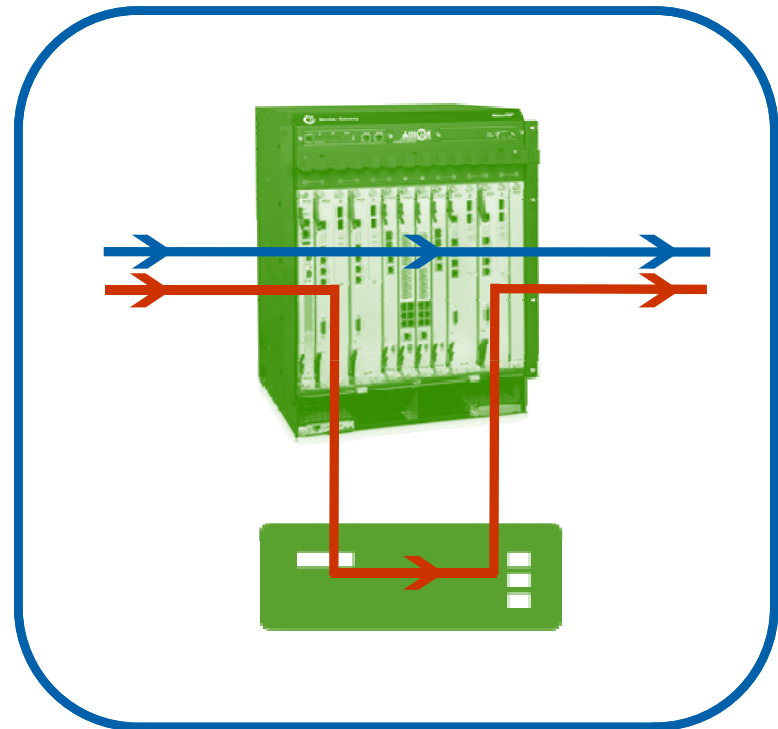
# Concepts: Service Chain



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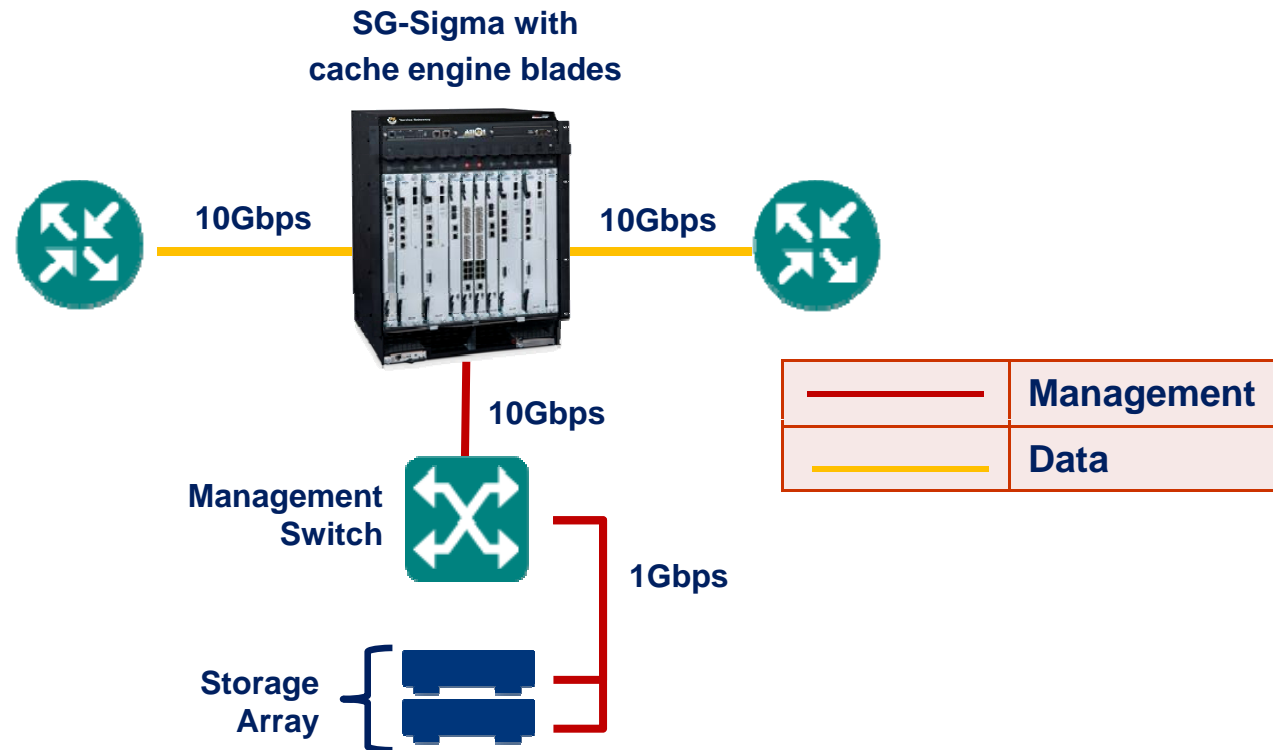
# Integrated Services - Agenda

- **Concepts**
- **4 Service Scenarios**
  - Internal Redirection (MS)
  - Internal Port Based Mirroring (SP)
  - External Redirection
  - External Mirroring (Policy Based)
- **Load balancing and Service Availability**
- **Service Chains**
- **SFC Port Usage**
- **Graphs**



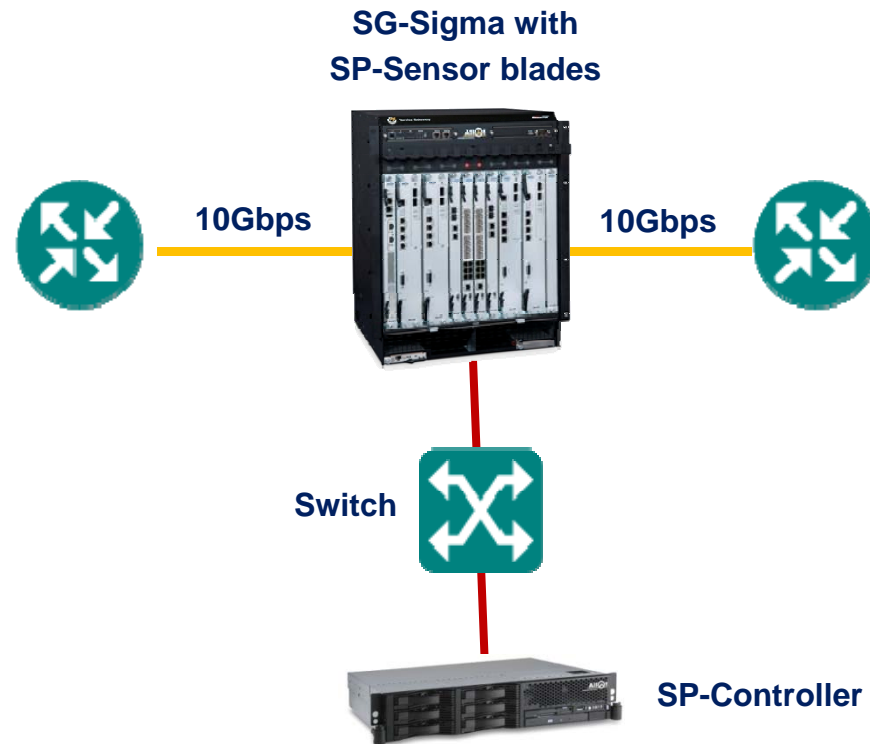
# Scenario 1: Steering to an Internal Service (MS) Typical Deployment

Slot	Blade
1	SGSV-110
2	CC-220
3	
4	CC-220
5	
6	FB-200
7	SFC-200
8	SFC-200
9	FB-200
10	NSS-MS
11	NSS-MS
12	NSS-MS
13	NSS-MS
14	BP-240



# Scenario 2: Mirroring to an Internal Service (SP) Typical Deployment

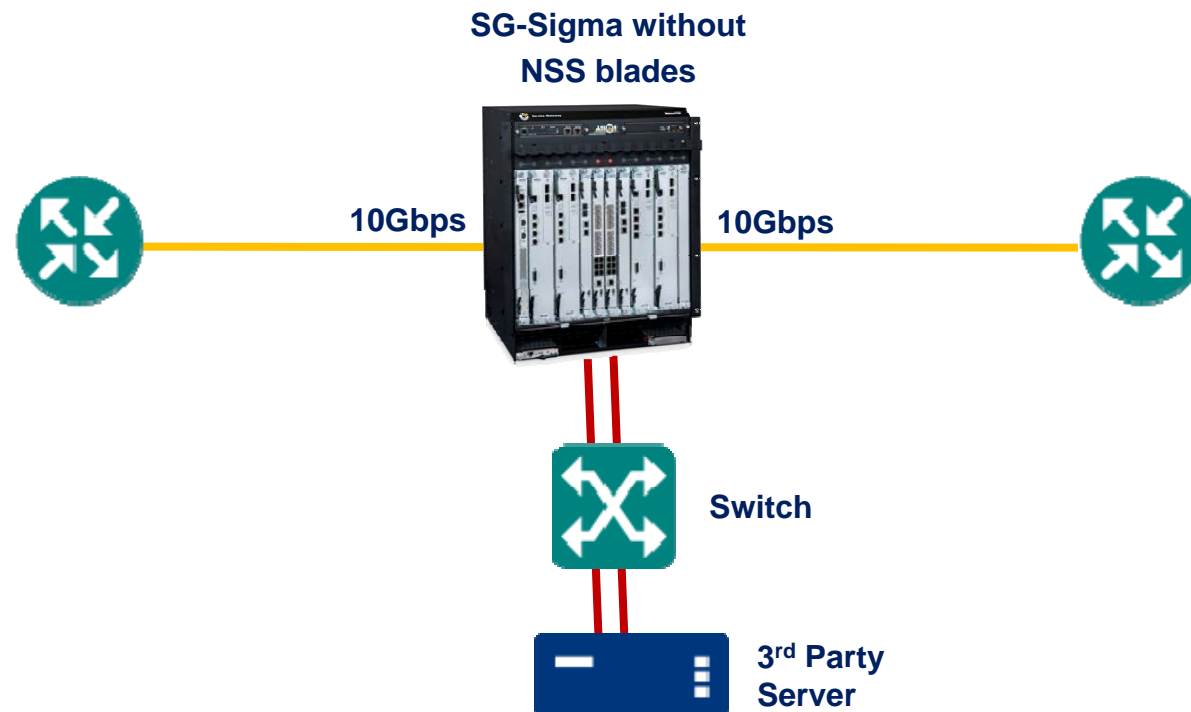
Slot	Blade
1	SGSV-110
2	CC-220
3	
4	CC-220
5	
6	FB-200
7	SFC-200
8	SFC-200
9	FB-200
10	
11	
12	<b>NSS-SP</b>
13	<b>NSS-SP</b>
14	BP-240



# Scenario 3: Steering to an External Service

## Typical Deployment - 3<sup>rd</sup> Party Service

Slot	Blade
1	SGSV-110
2	CC-220
3	
4	CC-220
5	
6	FB-200
7	SFC-200
8	SFC-200
9	FB-200
10	CC-220
11	
12	CC-220
13	
14	BP-240

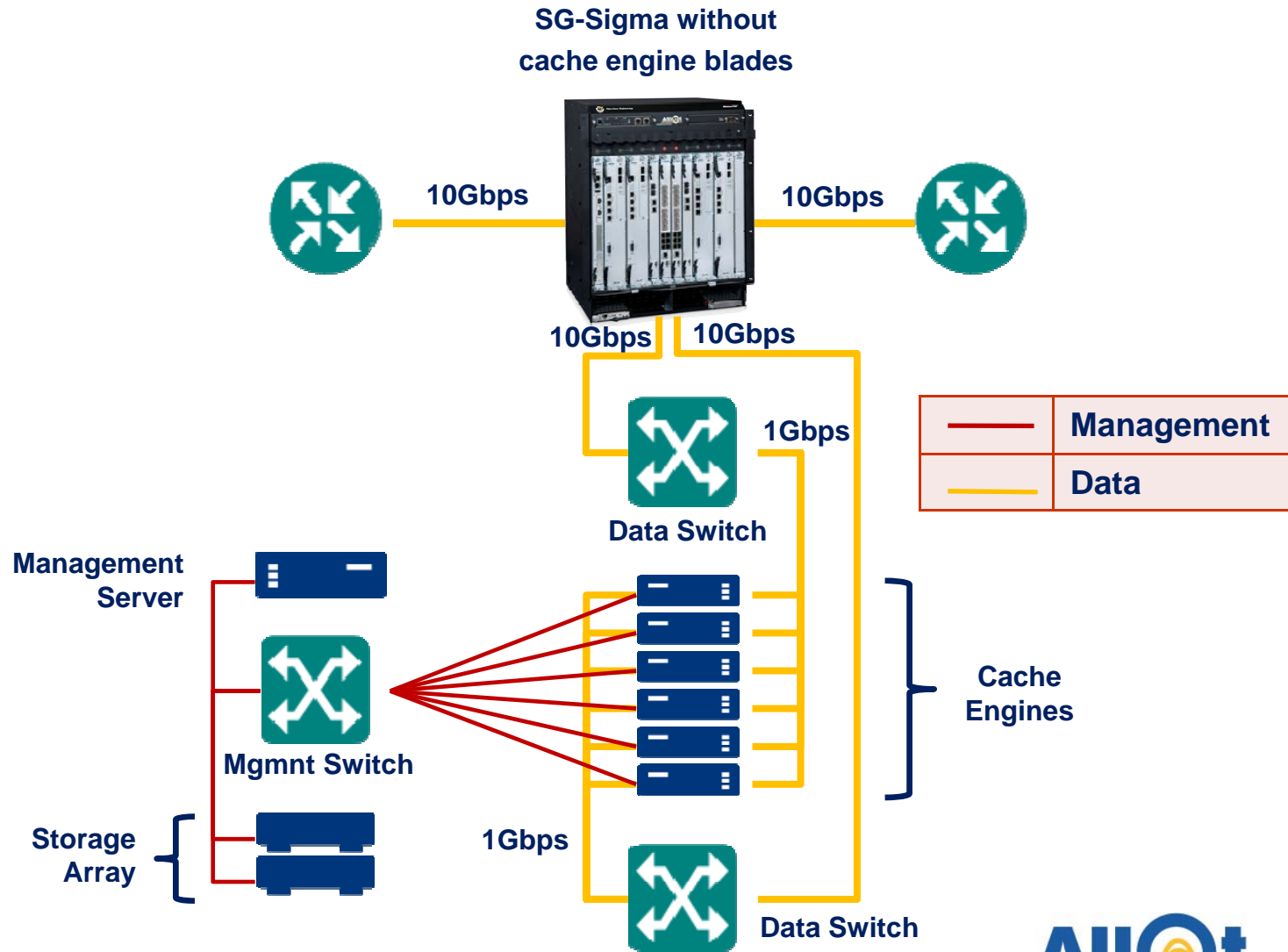


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# Scenario 3: Steering to an External Service

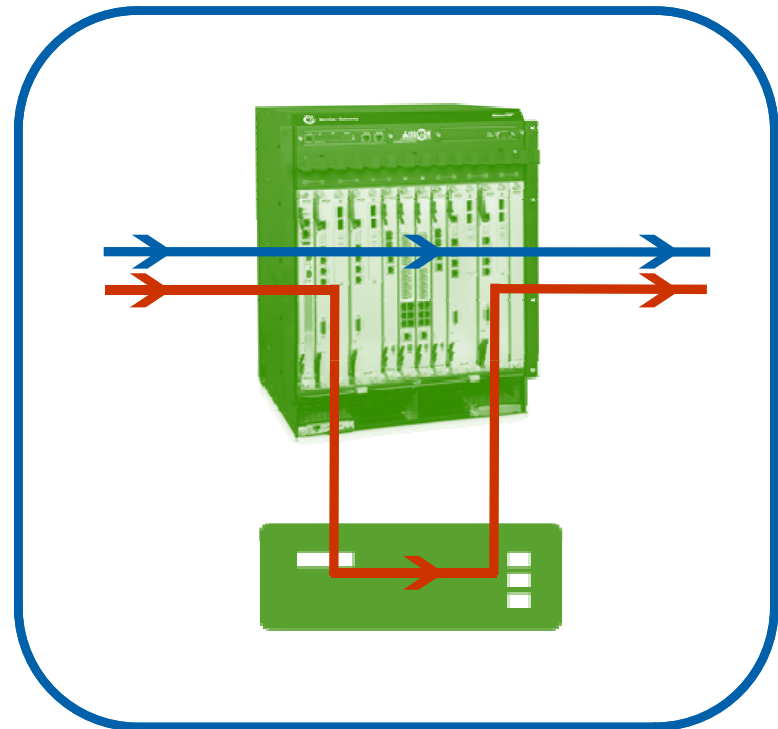
## Typical Deployment - MediaSwift

Slot	Blade
1	SGSV-110
2	CC-220
3	
4	CC-220
5	
6	FB-200
7	SFC-200
8	SFC-200
9	FB-200
10	CC-220
11	
12	CC-220
13	
14	BP-240



# Integrated Services - Agenda

- **Concepts**
- **Service Scenarios**
  - Internal Redirection (MS)
  - Internal Port Based Mirroring (SP)
  - External Redirection
  - External Mirroring (Policy Based)
- **Load balancing and Service Availability**
- **Service Chains**
- **SFC Port Usage**
- **Graphs**



# Load Balancing

- **The following load balancing schemes are supported:**
  - Balancing by internal IP (maintaining subscriber stickiness)
  - Balancing by external IP (maintaining destination stickiness)
  - Cyclic load balancing (round robin)
  - Additional load balancing schemes can be supported upon demand



# High Service Availability / Server Failure

- **Service clusters are configurable**

- A cluster is the set of the physical servers associated with a service
- Action on cluster failure is configurable per element:
- bypass, drop or re-balance (bypass/drop are for the specific element, re-balance is to share the traffic among the other elements)

- **Health monitoring capabilities**

- **Every element and its application status are monitored**

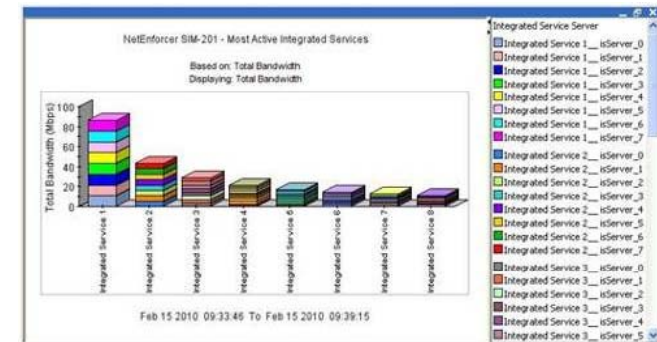
- Several service tracking/monitoring methods are supported:
- ICMP request/reply, HTTP Echo , (TCP syn) (port 80), BFD (Bidirectional Forwarding Detection) with a configurable monitoring interval.
- Other service tracking methods can be added upon demand



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# Service Monitoring

- The NE collect statistics for the traffic which is redirected to different services and how the traffic is load balanced between the servers making up each service. Specifically the following data is collected:
  - Steered traffic throughput in bps / direction
  - Steered traffic throughput in pps / direction
  - Steered connections per second
  - Number of concurrent steered connections



# Scenario 1: Steering to an Internal Service (MS) GUI Configuration

From the “Service Activation” Catalog , add a ”New Integrated Service”

The screenshot shows the Allot Communications NetXplorer GUI. The main window is titled "Allot Communications - NetXplorer. 10.4.82.2". The left sidebar shows a tree view of catalogs, with "Service Activation" selected. The main pane displays a table of services in the "Service Activation" catalog:

Name	Description	Type	Date Modified
None		Pass as Is	1/3/05 12:00 AM
Port Redirection		Port Redirection	1/3/07 12:00 AM
Service1		Integrated Service	11/30/09 6:43 PM
URL Monitoring		Integrated Service	11/1/09 12:00 AM
WebSafe		Integrated Service	11/1/09 12:00 AM

A context menu is open over the table, with the "New Integrated Service..." option highlighted in blue. Other options in the menu include "New IP Redirection...", "New Captive Portal...", "New VLAN Redirection...", "New Integrated Service Chain...", "Reload", "Cut", "Copy", "Paste", "Delete", "Print...", and "Properties...".

# Scenario 1: Steering to an Internal Service (MS) Configuring Integrated Service

**Integrated Service Entry Properties**

Name:

Description:

**Target**

Service Type: **Media Swift**

Service Admin Status:

Load Balancing Method:

Server Failure Action:

Service Unavailability Action:

Tracking Interface:

Tracking Method:

Local IP Address:

Tracking Intervals(sec):

Tracking Retries:

Server Capacity Reached Action:

Minimum Active Servers:

Flow Direction:

**Servers:**

Name	Server Deployment
Slot 13 Cache Engine	Internal
Slot 12 Cache Engine	Internal
Slot 11 Cache Engine	Internal

Scope:

## Service Type:

- Generic Redirection
- Generic Mirroring
- **Media Swift**
- Service Protector

## Service Availability Options

# Load balancing

**Integrated Service Entry Properties**

Name: MediaSwift (Internal)  
Description: Internal Deployment

**Target**

Service Type: Media Swift  
Service Admin Status: Active  
Load Balancing Method: Cyclic (round robin)  
Server Failure Action: Bypass  
Service Unavailability Action: Bypass  
Tracking Interface: In-band  
Tracking Method: BFD(Bidirectional Forwarding Detection)  
Local IP Address: 10.4.60.122  
Tracking Intervals(sec): 1  
Tracking Retries: 3  
Server Capacity Reached Action: Bypass  
Minimum Active Servers: 1  
Flow Direction: Both

**Servers:**

Name	Server Deployment
Slot 13 Cache Engine	Internal
Slot 12 Cache Engine	Internal
Slot 11 Cache Engine	Internal

Scope: Global

Save Reset Cancel

**Active/In-Active (The Inactive option is used for maintenance)**

**The Service Load balancing method:**

- Cyclic
- Hash by Internal IP
- Hash by External IP

**Server failure action:**

- Bypass
- Re-dispatch to other server
- Block

**No server available action:**

- Bypass
- Block

# Service Availability Options (1)

**Integrated Service Entry Properties**

Name: MediaSwift (Internal)  
Description: Internal Deployment

**Target**

Service Type: Media Swift  
Service Admin Status: Active  
Load Balancing Method: Cyclic (round robin)  
Server Failure Action: Bypass  
Service Unavailability Action: Bypass  
Tracking Interface: In-band  
Tracking Method: BFD(Bidirectional Forwarding Detection)  
Local IP Address: 10.4.60.122  
Tracking Intervals(sec): 1  
Tracking Retries: 3  
Server Capacity Reached Action: Bypass  
Minimum Active Servers: 1  
Flow Direction: Both

**Servers:**

Name	Server Deployment
Slot 13 Cache Engine	Internal
Slot 12 Cache Engine	Internal
Slot 11 Cache Engine	Internal

Scope: Global

Save Reset Cancel

Tracking interface to check if the service is up on a specific server:

In-band (Z2 High Speed Data Fabric)

Management (Z2 Base)

Tracking Method to identify that the service is up on a specific server:

None

BFD (Bidirectional Forwarding Detection) – Required for MediaSwift

Ping (not supported by MediaSwift)

HTTP Request

Local IP Address=source IP used for checking service availability

# Service Availability Options (2)

**Integrated Service Entry Properties**

Name: MediaSwift (Internal)  
Description: Internal Deployment

**Target**

Service Type: Media Swift  
Service Admin Status: Active  
Load Balancing Method: Cyclic (round robin)  
Server Failure Action: Bypass  
Service Unavailability Action: Bypass  
Tracking Interface: In-band  
Tracking Method: BFD(Bidirectional Forwarding Detection)  
Local IP Address: 10.1.1.60.122  
Tracking Intervals(sec): 1  
Tracking Retries: 3  
Server Capacity Reached Action: Bypass  
Minimum Active Servers: 1  
Flow Direction: Both

**Servers:**

Name	Server Deployment
Slot 13 Cache Engine	Internal
Slot 12 Cache Engine	Internal
Slot 11 Cache Engine	Internal

Scope: Global

Save Reset Cancel

Tracking Interval between polls for service availability (in sec)

Number of retries before concluding "service down"

Action when server capacity reached (bandwidth/connections) :  
Bypass  
Re-dispatch  
Block

Minimum Active servers for the service to be "up"

Limiting redirection for traffic coming from a specific direction:  
Both  
Client-Server  
Server-Client

# Scenario 1: Steering to an Internal Service (MS)

## Adding Each NSS-MS Blade as a Server

**Integrated Service Entry Properties**

Name:

Description:

**Target**

Service Type:

Service Admin Status:

Load Balancing Method:

Server Failure Action:

Service Unavailability Action:

Tracking Interface:

Tracking Method:

Local IP Address:

Tracking Intervals(sec):

Tracking Retries:

Server Capacity Reached Action:

Minimum Active Servers:

Flow Direction:

**Servers:**

Name	Server Deployment
Slot 13 Cache Engine	Internal
Slot 12 Cache Engine	Internal
Slot 11 Cache Engine	Internal

Scope:

Click to add each server or blade to which traffic can be redirected

# Scenario 1: Steering to an Internal Service (MS)

## Adding Each NSS-MS Blade as a Server

**Edit Server**

Name: Slot 13 Cache Engine

Admin Status: Active

Deployment: Internal

Management IP: 10 . 4 . 60 . 5

Server Slot: 13

SFC Port Internal Line: F1

SFC Port Internal Id: SFCA

SFC Port External Line: F1

SFC Port External Id: SFCA

VLAN Tag Internal: 1

VLAN Tag External: 1

Monitoring IP:

Server Mac1: : : : : :

Server Mac2: : : : : :

Bandwidth Capacity (kbps): 500000

Connection Capacity: 500000

Connection per second Capacity: 50

OK Cancel

**Server Admin Status:**  
Active  
Inactive

**Deployment:**

- Internal

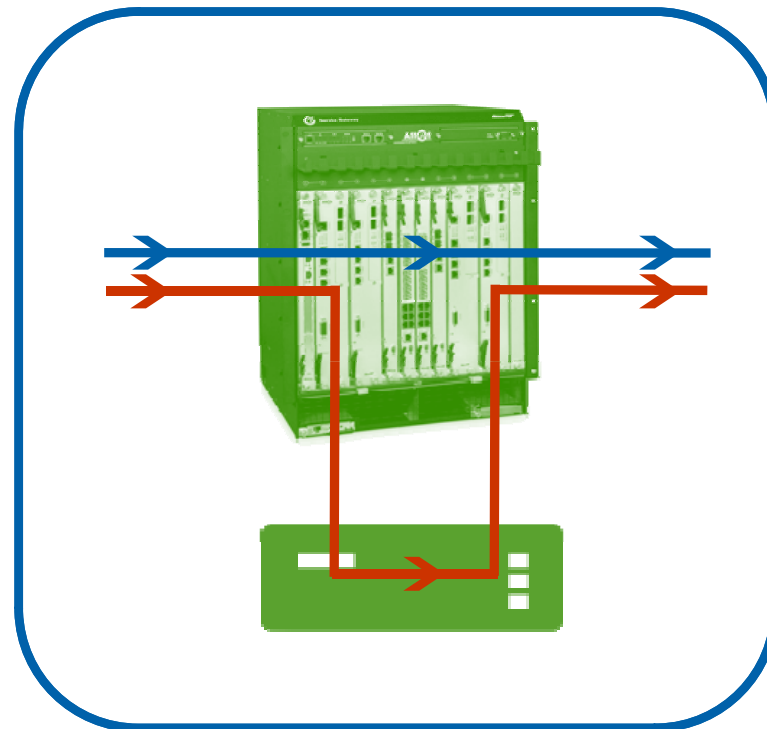
External Switched  
External Direct

**Management IP of the server is used when the NMS needs to interact with it for:**

- Sending configuration
- Receiving alerts

# Integrated Services - Agenda

- Concepts
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- Service Chains
- SFC Port Usage
- Graphs



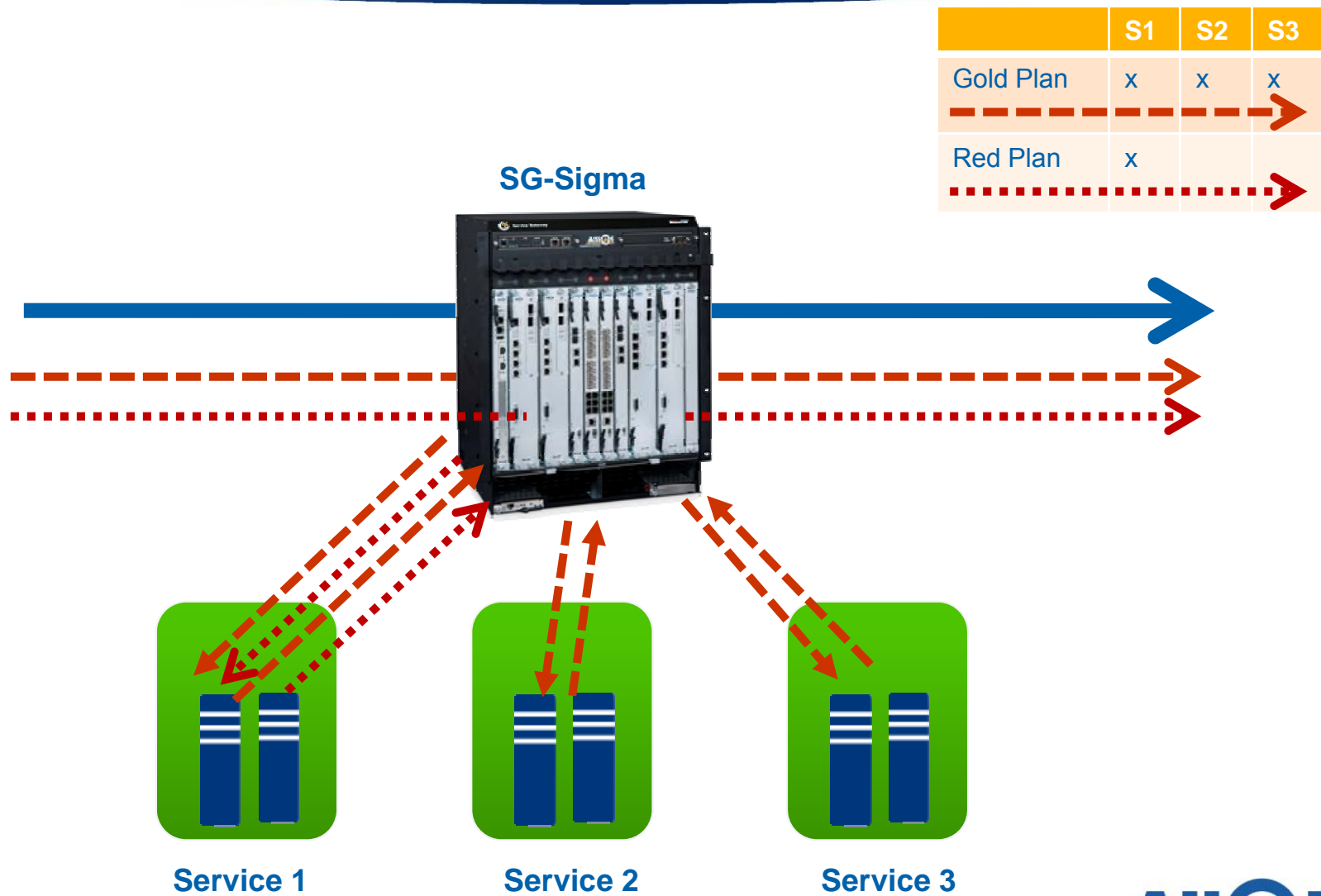
# Service Chaining

- **Service sequences are supported**

- A service chain, which consists of several successive services, can be configured
- The sequence is defined from outbound to inbound. For traffic flowing in the opposite direction (inbound to outbound) the order would be reversed
- Different types of services acting on the same traffic can be part of the same chain (e.g. parental control and media caching)



# Concepts: Service Chain



# Creating a New Service Chain

**Integrated Service Chain Entry Properties**

Name:

Description:

**Available**

- URL Monitoring
- ServiceProtector (External)
- ServiceProtector (Internal)
- Voice CDR Analysis**
- MediaSwift (External)**
- WebSafe
- MediaSwift (Internal)

**In Group**

Services:

Ordered Services:

Scope:  ...

# Creating a New Service Chain

**Integrated Service Chain Entry Properties**

Name:

Description:

**Available**

- URL Monitoring
- ServiceProtector (External)
- ServiceProtector (Internal)
- MediaSwift (External)

**In Group**

Services:

Ordered Services:

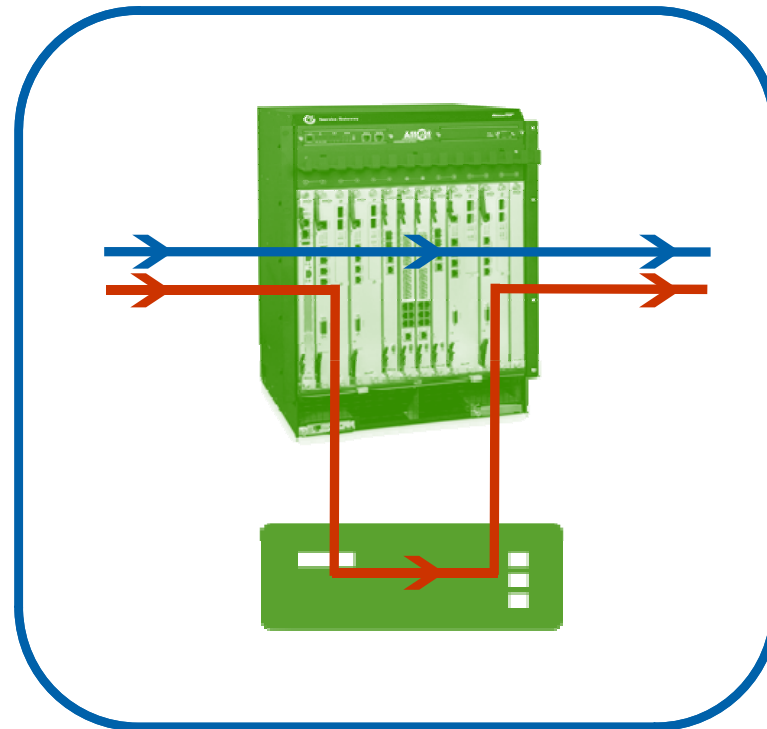
- Voice CDR Analysis
- MediaSwift (Internal)

Scope:

Save Reset Cancel

# Integrated Services - Agenda

- Concepts
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# SFC port configuration guidelines



**Reserved for Flow Balancer connection**

- Asymmetric Control Traffic
- Media Swift Storage

- Network Traffic
- External VAS
- Internal VAS resource use

- L1 connects to Left FB & L2 to right FB
- L3/L4 Asymmetric Control traffic is Approximately 3% of the total network traffic and will be using the same FB resources as L5/L6 respectively
- Internal VAS uses the Flow Balancer resources from 1 or 2 ports out of L5-L8 therefore the respective ports cannot be used as a network Links
- When L3/L4 are used for Asymmetric Traffic it is recommended to use L5/L6 for Internal/External VAS in order to enable full capacity on the Network Links (Except for Internal Media-Swift which is currently supported only on L8)

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# SFC port configuration examples

## Two FB's without VAS

	SFC_A	SFC_B
L1	FB	FB
L2	FB	FB
L3	ASY	
L4		
L5	NET	NET
L6		
L7	NET	NET
L8		

## Two FB's with VAS

	SFC_A	SFC_B
L1	FB	FB
L2	FB	FB
L3	ASY	
L4		
L5		NET
L6	EVAS/IVAS	
L7	N/A	N/A
L8	N/A	N/A

## Two FB's with two VAS's External + Internal Media Swift

	SFC_A	SFC_B
L1	FB	FB
L2	FB	FB
L3	ASY	
L4	Storage	
L5	NET	NET
L6		
L7	EVAS	NET
L8	IVAS (MS)	

ASY	Asymmetry	FB	Flow-Balancer	EVAS	External-VAS	Storage	External Switch connection to Media Swift Storage
NET	Network	N/A	Not Available	IVAS	Internal-VAS Reserved Resource	MS	Media Swift Reserved Resource

# Port Usage Configuration via GUI

The screenshot displays the Allot Communications NetXplorer GUI. The main window shows the configuration for a device named 'Sigma'. A 'Ports' table lists various ports, with 'SFC\_A\_F4' selected. A 'Port Properties' dialog box is open, showing configuration details for 'SFC\_A\_F4'.

Name	Physical Type	Detected setting	Action on failure	Usage
SFC_A_F3	Ethernet	Link Down	No action	Asymmetry
SFC_A_F4	Ethernet	Link Down	No action	N/A
SFC_A_F5	Ethernet	Link Down	No action	Network
SFC_A_F6	Ethernet	Link Down	No action	Network
SFC_A_F7	Ethernet	0 Mbps/Full duplex	No action	External Switched ...
SFC_A_F8	Ethernet	Link Down	No action	N/A
SFC_B_F3	Ethernet	Link Down	No action	N/A
SFC_B_F4	Ethernet	Link Down	No action	N/A
SFC_B_F5	Ethernet	0 Mbps/Full duplex	No action	Network
SFC_B_F6	Eth			network
SFC_B_F7	Eth			network
SFC_B_F8	Eth			network
MGMNT	Eth			/A

**Port Properties**

Port: SFC\_A\_F4

Physical Type: Ethernet

Detected Setting: Link Down

Speed: 10 Gbps

Duplex Mode: Full duplex

Action on failure: No action

Port Usage: Media Swift Storage

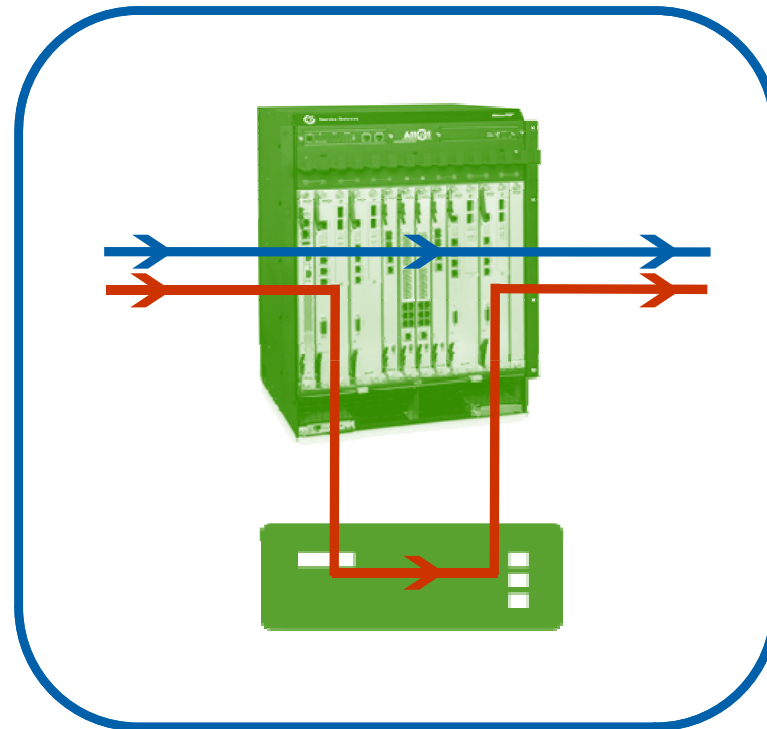
Usage options: Media Swift Storage, Asymmetry

Alarm Log:

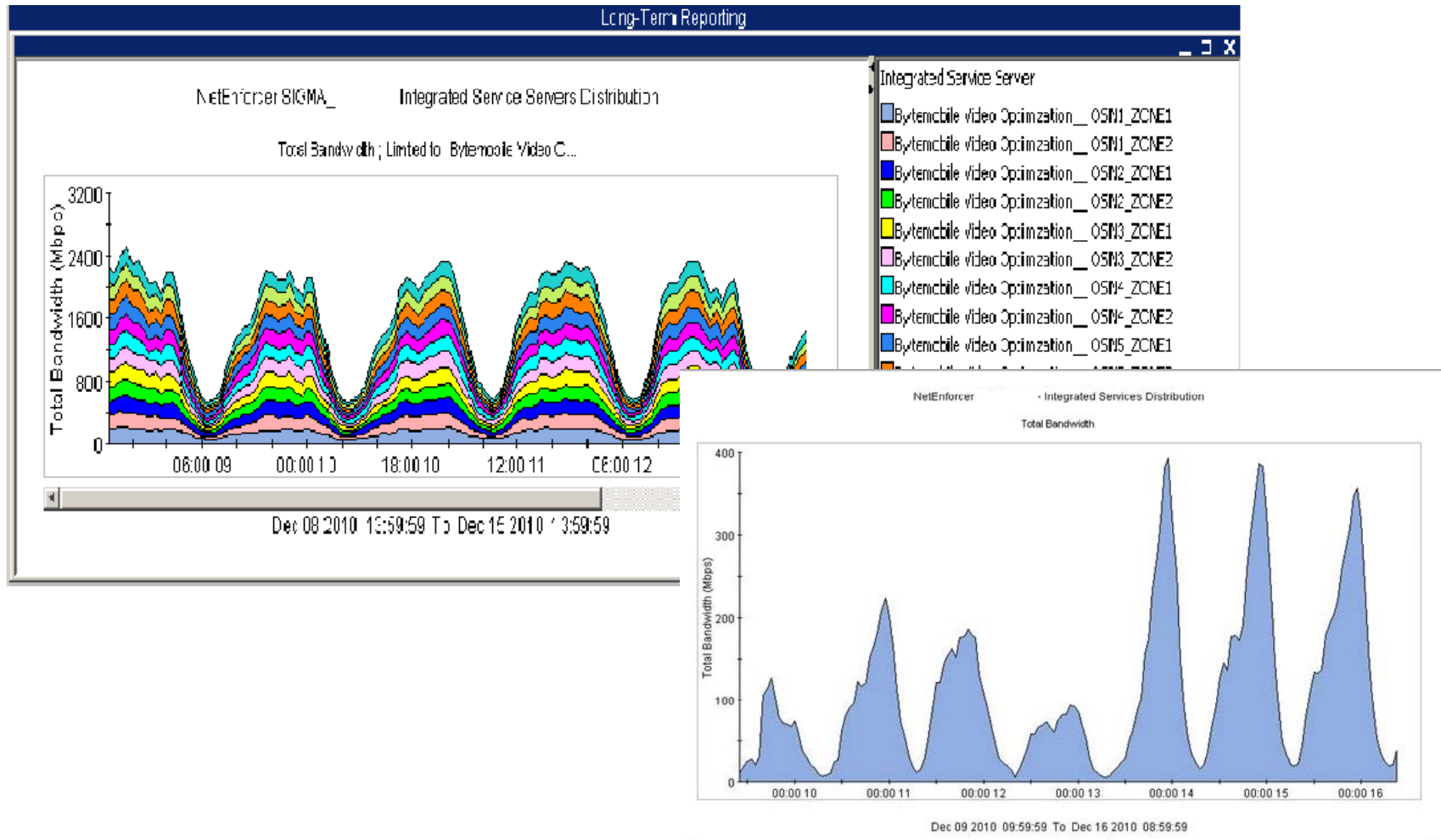
Ack	Date	Time	Severity	Alarm Def	Description
	Jan 12, 2010	5:08:56 PM	Major	-	Link SFC_A_F4 is down: admin status is up and operational...
	Jan 12, 2010	5:08:33 PM	Major	-	Link SFC_A_F5 is down: admin status is up and operational...
	Jan 12, 2010	4:04:12 PM	Critical	-	Board status from type Flow Balancer(slot 9) has changed: s...

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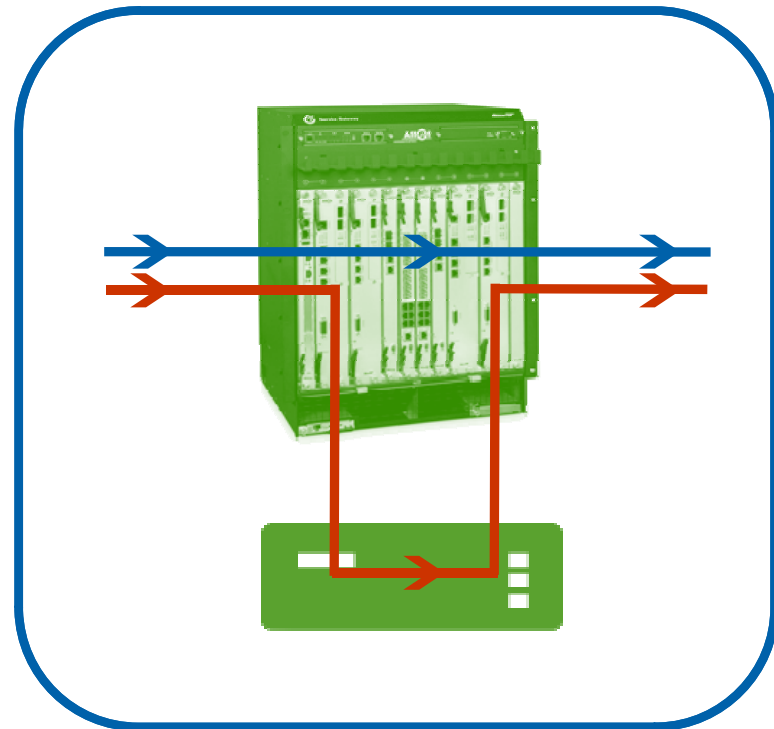


# Graphs



# Apendix: Bytemobile implementation

- Apendix: Bytemobile implementation



# Allot & Bytemobile Solution Overview

## ● Solution Scope.

- Allot SG will steer media traffic towards the Bytemobile Unison product
- Selective Redirection of traffic based on L3/L4 and L7 criteria
- Load balancing between cluster nodes
- Health checking of cluster nodes

# Possible Scenarios

1. Bytemobile solution with standard load-balancers (e.g. F5)
2. Bytemobile solution with Allot's Layer 4 traffic steering capabilities (i.e. the baseline solution)
3. Bytemobile solution with Allot's Layer 7 traffic steering capabilities (i.e. application-based steering solution)

## Scenario 2 Benefits

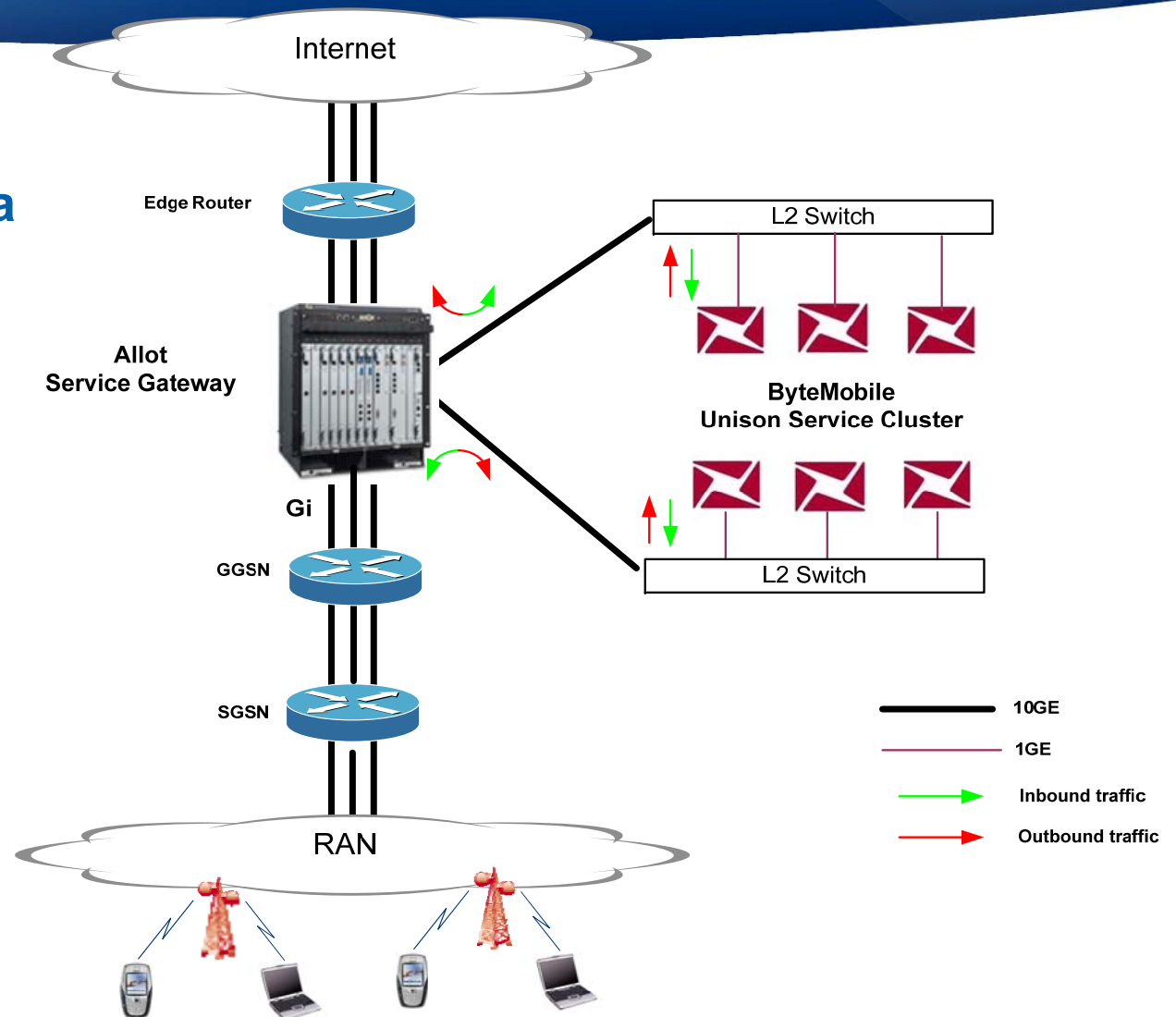
- Subscriber based traffic steering
- Cell based traffic steering
- Incorporated in current solution deployed
- Transparency
- No additional devices
- Centralized control

## Scenario 3 Benefits

- Scenario 2 advantages +
- Application based traffic steering
- Addition CAPEX savings:  
1SG Sigma = 2 LB
- Additional OPEX savings:  
less hardware = less maintenance

# Baseline Solution

- Allot's SG-Sigma works identically to a load balancer
- Redirects traffic selectively
- Load balance between cluster nodes
- Health check of cluster nodes



# Service concept and physical connectivity

- Allot's steers designated traffic flows to Services. Each Service represents a cluster of server (up to 128)
- SG connected on the Gi interface with multiple 10G (up to 8) or 1G (up to 16) interfaces in hairpin mode.
- Servers connected to a switch by 2 interfaces (inbound and outbound traffic separation)
- Supported configurations
  - Monitoring 2x10G network lines with redirection on 4x10G ports
  - Monitoring 7x1G network lines with redirection on 2x10G ports
  - Additional configuration upon requirement available

# Redirection Decision

- **Traffic redirection based on policy configuration criteria:**
  - **Application**
  - **Service Layer3/Layer 4 (IP addresses/subnets, ports, TCP/UDP, ToS bits)**
  - **Subscriber (or PDP session)**
  - **Cell (if cell awareness deployed)**
  - **VLAN**
  - **Time**
  - **PCRF decision**

# Traffic Flow to Bytemobile

- **L2 transparent (IPS/firewalls), L3 Transparent proxy redirections**
- **Bytemobile works as a proxy server with mixed transparent and non-transparent proxy modes**
- **SG will act as default GW for non transparent L2 servers**
- **SG support dispatching using destination MAC, VLANs, or a combination**
- **SMP forwards Radius accounting messages to Bytemobile servers.**