Mobile Gi LAN Consolidation

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Solution Architect
Agenda

• The Requirements – Challenges with current approach
  • Traffic growth – The need to re-architect
  • Uncertain market trends – The need to adapt
  • Future evolution – The need to virtualize

• The Solution – Re-architecting the Gi LAN with F5
  • A Consolidated Approach
  • Optimize the Gi LAN
  • Monetize the Gi LAN
  • Secure the Gi LAN

• Conclusions
The Challenges with current approach
Complex architectures in the S/Gi network

Value-added services (VAS)

- Video optimization
- Transparent caching
- URL filtering

Challenges
- Complex architecture, hard to scale
- Resulting high CapEx and OpEx
- Difficulty adding new services
The new Gi LAN should focus on …

**Optimize**
- Intelligent steering to VAS
- Consolidate L4-L7 functions
- TCP Optimization
- Migrate to NFV-based solution

**Monetize**
- Quality of Experience mgmt
- Easy opt-in/opt-out modules
- OTT partnerships & flexible charging

**Secure**
- Network Security (Gi FW)
- Dynamic subscriber security
- IPv4/IPv6 Transition
NET NEUTRALITY

• The principle of "net neutrality" means that traffic should be treated equally, without discrimination, restriction or interference, independent of the sender, receiver, type, content, device, service or application.

• A "specialised service" means an electronic communications service optimised for specific content, applications or services, or a combination thereof, provided over logically distinct capacity, relying on strict admission control, offering functionality requiring enhanced quality from end to end.

• Providers of internet access services and end-users may agree to set limits on data volumes or speeds for internet access services.
A changing environment

SSL INCREASE

• “In Europe, the usage of SSL encrypted traffic quadrupled from 1.46 percent a year ago to 6.1 percent today “ (*)

• HTTP 2.0 being standardized in IETF with browsers requiring TLS encryption when setting up HTTP 2.0 connections

(*) Sandvine Global Internet Phenomena report – 1H2014

IPV6 ADOPTION

• European carriers and Google Fiber are leading the IPv6 charge (*)

• In Europe operators such as Deutsche Telekom shows 22% IPv6 and France's Free shows 37% IPv6

(*) Akamai state of the internet report
A changing environment

SOFTWARE DEFINED NETWORKING (SDN)

- Separate control plane from data plane in forwarding elements
- API-driven forwarding rules in data plane
- Focused on L1-L4 forwarding

NETWORK FUNCTION VIRTUALIZATION (NFV)

- Decoupling software from hardware (deploy control plane and data plane functions in a virtualized environment)
- Flexible network function deployment
- Dynamic operation
- Focused on L3-L7 layers of OSI stack
Current Gi LAN architecture may not fit tomorrow’s needs

The European Union may severely limit the use cases in which the mobile operator can deploy traditional DPI and intelligent charging techniques.

The increasing amount of encryption used on the public internet will severely limit the ability to inspect subscriber flows using traditional DPI technologies. Video encryption will also reduce or even eliminate the benefits of traditional web & video optimization technologies.

The introduction of IPv6 and the growing adoption will require intelligent IPv4/IPv6 transition technology that also secures the infrastructure and the end users (CGNAT/GiFW).

NFV initiatives will drive mobile operators to look into solutions that can help them to seamlessly migrate in a stepwise approach from a pure physical to a full virtual environment on the Gi LAN.

AN UNCERTAIN FUTURE ⇒ NEED FOR A MORE “FLEXIBLE/ADAPTIVE” SOLUTION ON THE GI LAN
The Solution
Re-architect the Gi LAN with F5
F5 in the S/Gi network – A Consolidated Approach
Simplifying the delivery of network services

BEFORE F5

WITH F5
Key F5 network services – Optimize, Monetize, Secure

A unified platform and single management framework

- Intelligent traffic management
- CGNAT and IPv6 migration
- ICSA certified network firewall
- Policy enforcement
- Header enrichment and TCP optimization
- Local DNS
- URL filtering (HTTP URI / HTTPS SNI)
Optimize the Gi LAN

### Increase VAS Layer Efficiency
- Context-aware and policy-enabled traffic steering to offload VAS & optimization services complex

### Consolidate Network Functions
- Consolidation of L4-L7 functions into a single platform (steering, DPI, firewall, CGNAT, ...)

### TCP Optimization
- Increase throughput and web page load times on the radio network

### NFV-Ready (VAS Bursting)
- As traffic increases, scale to meet demand with VAS service bursting and improve end user experience and application performance
Optimize the Gi LAN – Increase VAS Efficiency

INTELLIGENT STEERING

CONTEXT

SUBSCRIBER
DEVICE-TYPE
RAT-TYPE
CONTENT (VIDEO, URI, ...)
CONGESTION

Data Center

Video Optimization
Transparent Caching
Parental Controls
WAP Gateway

Context-aware & policy-driven steering & intelligent service chaining
Optimize the Gi LAN – Consolidate Network Functions

2005–2010
- L2 switching
- MPLS L2 PE
- L3 routing
- MPLS L3 PE
- BRAS/BNG

Multi-service router

Dedicated platforms, different vendors

L2–L3 consolidation

2010–2014
- IP ROUTING
- MPLS L2 PE
- MPLS L3 PE
- BRAS/BNG
- Full Proxy (TCP opt, HHE)
- Firewall
- Policy Enforcement
- CGNAT
- L3/L4 Steering

Unified platform, L4–L7 consolidation

L4–L7

Dedicated platforms, different vendors

TCP OPTIM
DPI/PCEF
L7 STEERING
FW/CGN
HTTP HE

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Optimize the Gi LAN – TCP Optimization

High Goodput

Minimal Buffer Bloat

Flow Fairness

Cell-optimized TCP stack

VIPRION EXPRESS

WAN-optimized TCP stack

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Optimize the Gi LAN – NFV-Ready
A stepwise approach: From VAS bursting to full NFV solution
Monetize the Gi LAN
From flat fee to value based pricing models

**BANDWIDTH CONTROL & QUALITY OF EXPERIENCE MANAGEMENT**
Bandwidth controls, TCP optimization and context-aware traffic steering to optimization platforms for enhancing the subscriber’s quality of experience

**OPT-IN / OPT-OUT VALUE ADDED SERVICES**
Intelligent and context-aware traffic steering to value added service platforms based on a subscriber opt-in/opt-out model

**OTT MONETIZATION & FLEXIBLE CHARGING**
Monetizing OTT services by flexible charging mechanisms and OTT partnerships for service differentiation
Monetizing the subscriber relationship using big data (targeted ads, mobile payment)
Monetize the Gi LAN – Bandwidth and QoE management

PER-SUBSCRIBER BANDWIDTH CONTROL

Gold Subscriber (20 Mbps)
Silver Subscriber (10 Mbps)
Bronze Subscriber (5 Mbps)

Even if subscriber is entitled for more by subscriber bandwidth policy his P2P traffic gets reduced to configured value (512 kbps)

PER-SUBSCRIBER PER APPLICATION BANDWIDTH CONTROL

Gold Subscr total (20 Mbps)
Gold Subscr p2p (512 kbps)

Even if subscriber is entitled for more by subscriber bandwidth policy his P2P traffic gets reduced to configured value (512 kbps)
Monetize the Gi LAN – Opt-in / Opt-out Services

INTELLIGENT STEERING & SERVICE CHAINING

- PCRF controls steering and service chaining on a per subscriber basis (dependent on subscription)
- Any combination of services is possible

PCRF controls steering and service chaining on a per subscriber basis (dependent on subscription)

Any combination of services is possible
Monetize the Gi LAN – OTT & Special Svc Monetization

OTT MONETIZATION & FLEXIBLE CHARGING

- Subscription models / bundles for OTT or specialized service
  - Bundled into subscription for a lower fee
  - OTT traffic excluded from volume bundle
  - OTT traffic marked/tagged for differential treatment at radio layer
Secure the Gi LAN

**IPV4 CENTRIC NAT44**

Solving the IPv4 address exhaustion problem with NAT44 (with CGN acting as FW)

**IPV6 CENTRIC NAT64 / 464XLAT**

Migration to IPv6 only architecture using NAT64/DNS64 and/or 464XLAT

**GI FIREWALL (IPV4/V6) & NETWORK DDOS**

Protect network infrastructure and radio resources against outside threats
Secure the Gi LAN – IPv4 centric / NAT44

- Dynamic NAPT, Deterministic NAPT, Port Block Allocation
- Extensive ALG, hairpinning and EIF/EIM support
- Unprecedented scale & performance (Gbps, cps, max conns)
- High-Speed logging with flexible log field inclusion/exclusion
Secure the Gi LAN – IPv6 centric / NAT64 & 464XLAT

- NAT64/DNS64 and 464XLAT support for IPv4-only destinations
- Gi firewall for native IPv6 traffic
- Unprecedented scale & performance (Gbps, cps, max conns) for both NAT and Gi firewall
Secure the Gi LAN – Gi Firewall & DDOS Mitigation

- Unprecedented scale & performance (Gbps, cps, max conns) for Gi firewall
- BIG-IQ for Centralized management of security policies & DDOS profiles
- Protection against device vulnerabilities (battery drain attacks, malware) and network vulnerabilities (RAN resource exhaustion, revenue leakage, policy violations)
Conclusions
Advantages of S/Gi network consolidation with F5

36-46% lower TCO

$1.1 million
Projected 5-year cost savings for 20M subscribers

S/Gi Network Simplification: 5-Year Cumulative TCO

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<tr>
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<th>CapEx</th>
<th>OpEx</th>
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<td>F5 Networks</td>
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<td>Alternative Point Products</td>
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$- $2 $4

Millions

36% Lower Cost
Advantages of S/Gi network consolidation with F5

Big savings in your VAS infrastructure with intelligent traffic steering from F5

$80.8 million
Projected 5-year cost savings for 20M subscribers

With F5
VAS Service Only

53% Lower Cost

VASs include video optimization and transparent caching
Take a phased approach to this architecture …

Immediate pain point

- Improve VAS
- Security at scale
- Address IPv4 depletion

Implementation phase

1. ITM
2. S/Gi FW
3. NFV
4. CGNAT
5. PEM

• Different approaches for different needs and priorities
• Flexibility and extensibility to future-proof your network
... And benefit from our flexibility to adapt

<table>
<thead>
<tr>
<th>Net neutrality law not voted yet</th>
<th>Net neutrality law voted</th>
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<tbody>
<tr>
<td>• OTT partnerships (DPI for per-subscriber application prioritization / free-rating)</td>
<td>• Per-subscriber volume limits and bandwidth control</td>
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<tr>
<td>• Intelligent traffic steering to video optimization based on subscriber profile, congestion levels, etc.</td>
<td>• Intelligent steering to video optimization based on bandwidth</td>
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<td>• URL filtering / parental control (?)</td>
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<tr>
<th>Minority of traffic is SSL</th>
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<tr>
<td>• Use traditional DPI techniques for application detection and control</td>
<td>• Use SSL SNI check against URL database for application detection and control</td>
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<tr>
<td>• Use TCP optimization + intelligent steering to video optimization</td>
<td>• Use TCP optimization only</td>
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<tr>
<th>Majority of traffic is IPv4</th>
<th>Majority of traffic is IPv6</th>
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<tr>
<td>• Use CGNAT/NAT44 for IPv4 internet services</td>
<td>• Deploy NAT64/DNS64 with IPv6 Gi Firewall</td>
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<tr>
<td>• Introduce dual-stack with IPv6 and enable IPv6 Gi firewall</td>
<td>• Alternatively deploy 464XLAT with IPv6 Gi Firewall</td>
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F5 Consolidated Gi LAN solution

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- Network Security (Gi FW)
- Dynamic subscriber security
- IPv4/IPv6 Transition

If I can be of further assistance please contact me:
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Solutions for an application world.
F5 for L4-L7 Consolidation
Context-aware full-proxy architecture

**Context**
Subscriber-id, Device-type, Application, RAT-Type, Congestion level, ...

- HTTP hdr inspect – filter
- HTTPS / SSL SNI check
- URL classification
- DPI analysis

- TCP optimization

- L4
  - Network
  - Session
  - Application
  - Client / Server

- L7
  - Network
  - Session
  - Application
  - Client / Server

- HTTP hdr enrich
- HTTP hdr inspect - filter
- DPI analysis

- Gi Firewall, CGNAT

- Context-aware Steering
  - Service Chaining
  - Bandwidth control
  - Accounting/Charging

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