How to Turn the Costs of Monitoring 5G to Your Advantage

Gigamon®

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5G is expected to be the fastest growing mobile technology — reaching 100 million subscriptions at least 2 years faster than 4G.

Source: Ericsson

Introduction

The deployment of fifth generation (5G) mobile communication infrastructure and services promises to be as expensive to deploy as prior mobile communication infrastructures — perhaps even more so. New and never previously deployed technologies, availability of new RF frequency bands, more densely packed towers, multitudes of miniature cells, new low-latency B2B-enabling services and a proliferation of new endpoints, all supported by 5G's vast ability to carry more traffic than prior generations, contribute to deployment challenges and knock-on instrumentation expenses.

This new deployment landscape requires mobile operators to fund the purchase of large numbers of expensive analytic tools and network probes, all while keeping the existing 4G network up and running during the migration phase. The Gigamon Visibility and Analytics Fabric™ (VAF) breaks the spiralling cost curve relationship for 5G deployments, reduces overall spend, drastically reduces the amount of traffic to be processed and analyzed, spreads tool and probe spend over multiple years, and creates noticeable cost savings that flow directly to the mobile operator's bottom line, resulting in an economic advantage the mobile operator can realize as a competitive advantage.

This paper will examine how to cost-effectively deploy 5G — without breaking the bank — and show methods to flatten the deployment cost curve, as well as to provide ways to maximize service revenue while highlighting innovative methods to reduce network running costs.

356 operators in 121 countries are investing in 5G mobile or 5G FWA/home broadband networks. 78 operators in 43 countries have announced the deployment of 5G within their live networks. 62 operators in 34 countries have announced 3GPP 5G service launches (or limited service launches).

(GSA, Feb. 2020)

LTE is a global success, with nearly 5 billion subscriptions connecting over 55 percent of mobile users worldwide, and it is the fastest developing mobile system technology ever. From 3GPP Release 15 onward, the community has been defining 5G networks, starting with non-standalone 5G systems that integrate with existing LTE networks, and then moving on to standalone 5G systems with substantially different network configurations.

(GSA, Feb. 2020)

The Gigamon Economic Advantage

In a recent research study commissioned by Gigamon and performed by ACG Research, an independent telecom analyst firm, a real-life deployment scenario was studied with and without the deployment of a Gigamon solution. The study looked at the cost savings and traffic-reduction impact of Gigamon traffic-reduction techniques.

Estimated Annual Capital Investment: Probes + Gigamon
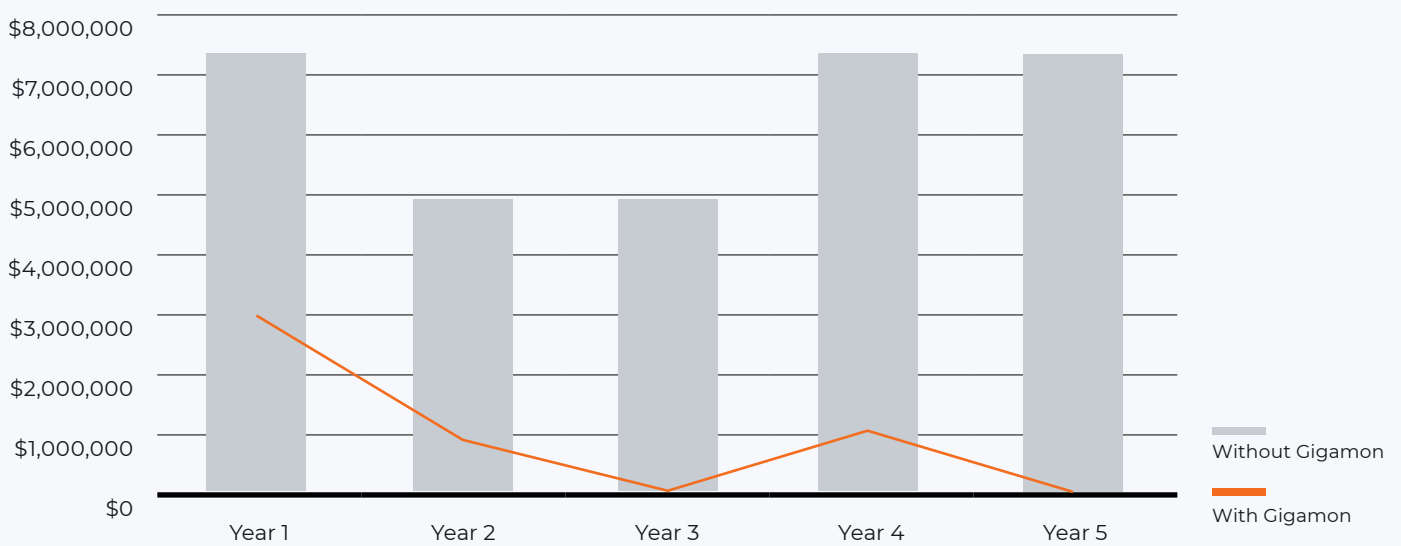
Savings & ROI	Year 1	Year 2	Year 3	Year 4	Year 5
Cumulative Savings with Gigamon	$4.4 million	$8.3 million	$13.3 million	$19.8 million	$27.3 million
Payback	8 months	3 months	0 months	2 months	0 months
Cumulative ROI	143%	200%	320%	378%	521%
Cumulative Savings	59%	67%	76%	79%	84%

Figure 1: The Gigamon economic advantage. (Source: ACG Research)

+ The Gigamon solution reduces traffic to monitoring probes while preserving key analytic data necessary for mobile providers to manage their packet cores

+ The traffic reduction results in significant savings in probes

+ For 10 core sites with 2.5 million subscribers in each site, the cumulative *Gigamon-enabled savings are up to $27.3 million with a 521 percent ROI*

Spotlight on 5G

Quantifying the Performance Benefits of 5G

10x **DECREASE IN LATENCY** Delivering latency as low as 1 millisecond	**10x** **CONNECTION DENSITY** Enabling more efficient signaling for IoT connectivity	**3x** **SPECTRUM EFFICIENCY** Achieving even more bits per Hertz with advanced antenna techniques
10x **EXPERIENCED THROUGHPUT** Bringing more uniform, multi-Gbps peak rates	**100x** **TRAFFIC CAPACITY** Driving network hyperdensification with more small cells everywhere	**100x** **NETWORK EFFICIENCY** Optimizing network energy consumption with more efficient processing

[1] Figure 2: Quantifying the performance benefits of 5G. (Source: IDC)

5G has been designed from the ground up to enable the monetization of 5G services for B2B markets. It allows for more devices, with higher bandwidths and lower latencies, with greater efficiencies: Low latency services allow many millions of new endpoints, such as autonomous vehicles, to connect to the network for the first time, as well as new B2C services such as mobile broadband, enabling HD content to be watched on many different devices at the same time.

+ 5G will provide a tidal wave of new traffic — too much to monitor all of it cost-effectively

+ 5G brings greater complexity, with several parallel networks all in one

+ Not enough staff to support existing 4G deployments and deploy new 5G technologies and services

+ Analytic tools will be too expensive to provide 100 percent subscriber traffic coverage

+ New entry and greenfield vendors

+ The well-defined hardware-based network elements now live as software in the private and publicly hosted cloud

+ Brand-new technologies such as control and user plane separation (CUPS), multi-access edge compute (MEC), network slicing, new RF frequency bands and virtual infrastructure

+ The need to do more with less

+ There are new devices, new services, new traffic types and possibly new unknown failure modes

+ New or more exposed security vulnerabilities

+ Certain services, traffic types and subscribers are more valuable to the mobile operator than others

+ The need to break the 5G analytic tool and probe cost curve

5G's Five Main Challenges

5G is the fifth generation of mobile communication technology to be deployed and, not surprisingly, there is a corresponding number of deployment challenges.

1. INCREASING TRAFFIC RATES AND VOLUME

+ Peak speeds of 4.3Gbps in lab settings and projected speeds up to 10Gbps
+ More densely packed towers means more subscribers, more devices and more traffic per square km
+ Higher RF bands allow for substantially more bandwidth per square km

Mobile Momentum Metrics by 2023

	More Mobile Users	More Mobile Connections	Faster Mobile Speeds
2018	5.1 BILLION	8.8 BILLION	13.2 MBPS
2023	5.7 BILLION	13.1 BILLION	43.9 MBPS

[2] Figure 3: Global wireless networking metrics. (Source Cisco: VNI)

2. PROLIFERATION OF ENDPOINTS

+ 5G is designed for the internet of things (IoT) and operational technology (OT)
+ Billions of new devices and connections are expected to join the network
+ Global mobile machine-to-machine (M2M) growth

30% CAGR 2018-2023
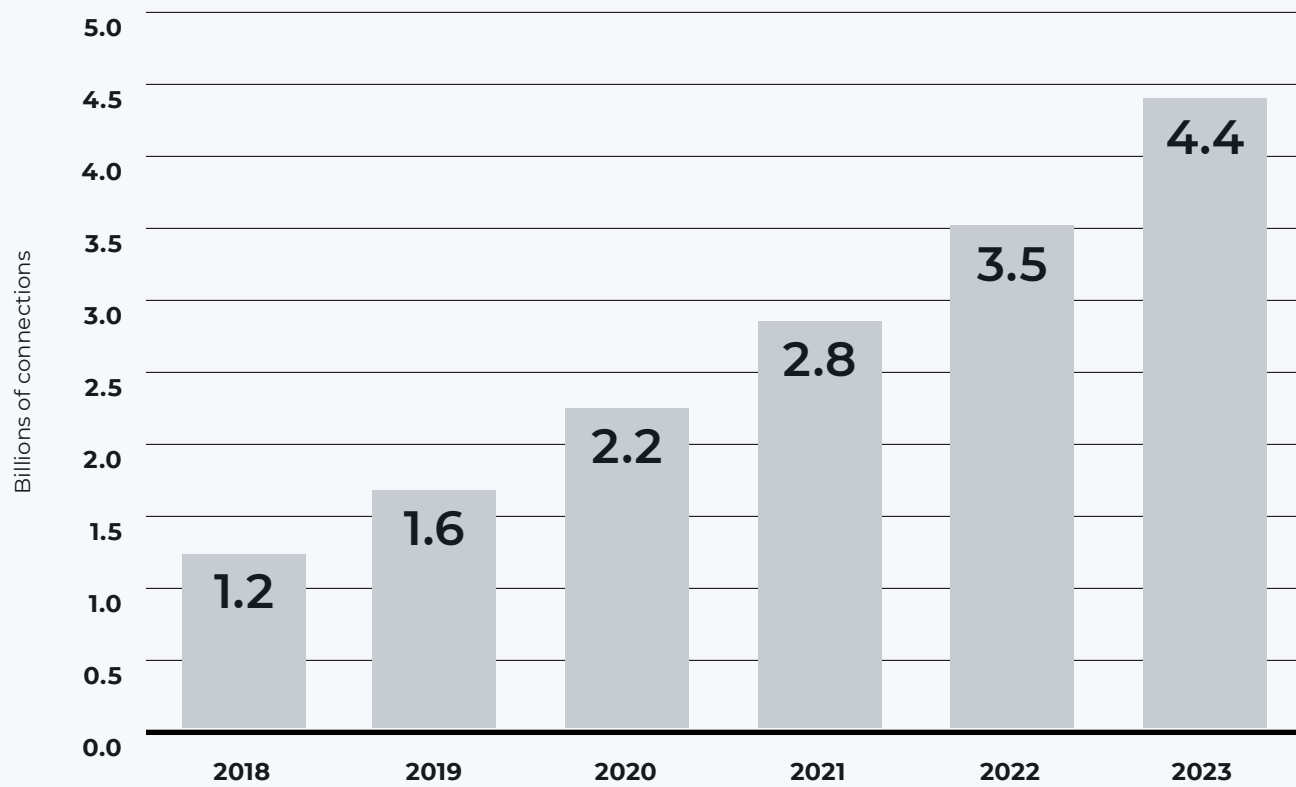
[3] Figure 4: Proliferation of endpoints. (Source: Cisco VNI)

3. NEW AND SENSITIVE TRAFFIC TYPES

+ Low-latency applications such as autonomous vehicles require low latency to avoid life-and-limb injuries. 4G network latency can be as high as 30ms, versus an expected 1ms latency for 5G, allowing these new services to be almost real time.
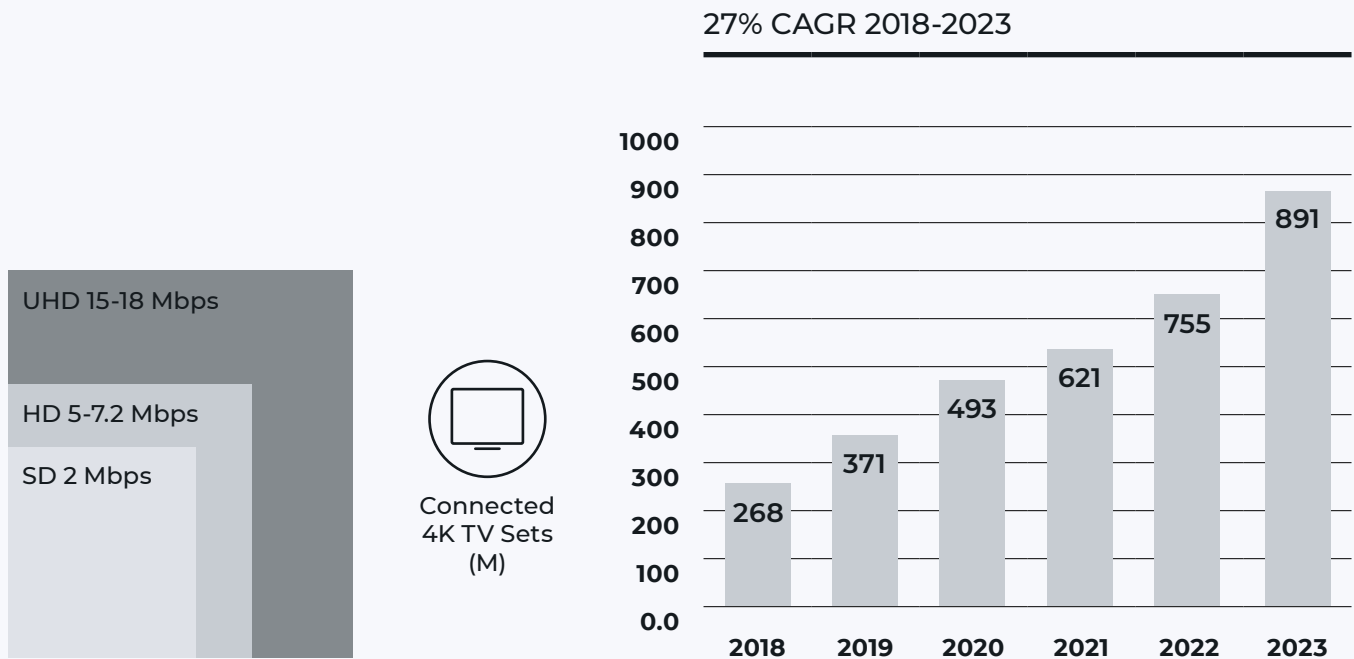
+ Highly bursty traffic patterns as found in MEC services, video streaming and online gaming.

+ UHD video requires reliable connections, low packet loss and high throughput to avoid video glitches.

Growth of Video Traffic Bandwidth

UHD 15-18 Mbps

HD 5-7.2 Mbps

SD 2 Mbps

Connected 4K TV Sets (M)

27% CAGR 2018-2023

Year	Value
2018	268
2019	371
2020	493
2021	621
2022	755
2023	891

[4] Figure 5: Growth of video traffic bandwidth. (Source: Cisco VNI)

4. NEW 5G TECHNOLOGIES

Higher RF bands, with unknown in-building and atmospheric performance, mean closer tower proximity and more towers and access points — leading to more backhaul network complexity

Network slicing may be prone to configuration and reliability issues

Virtual infrastructure/new software-based mobile core network elements may be challenging to deploy

Server spin-up and tear-down of processing and storage containers will likely place tremendous strain on network and cloud datacenter resources

Figure 6: New technologies found in 5G deployments. (Source: Gigamon)

5. NEW SECURITY THREATS

Digital transformation and innovations designed to offer subscribers more of what they want only complicate matters and create more opportunities for threat actors. 5G, for example, with all its benefits, is still evolving, and the immaturity of the architecture and technologies increase risk. In fact, several vulnerabilities have already come to light:

+ Distributed denial-of-service (DDoS) attacks, encryption hijacking, fraud, rogue devices

+ VoLTE vulnerabilities, exploitation of datacenter traffic and subscriber credentials

+ New vulnerability holes in new 5G network architectures, existing holes in existing architectures

Due to its new architectures, technologies and openness, a 5G network needs to be treated as a Zero Trust environment. The only way to truly ensure a secure network, with secure devices and secure subscribers, is by enabling the continuous monitoring of the traffic in motion across the network with several different types of security tools. The mobile operator can then further enhance its network security as new potential threats come to light or are exposed and new issues are detected. A comprehensive paper written by Gigamon, which covers this area, contains more and in-depth information on the security aspects, use cases and approaches applicable to 5G deployments.

The above five problems combine as a challenge for the mobile operator to deploy economically efficient and secure networks and services. Failure to mitigate these issues upfront may result in the loss of any economic advantage that 5G may bring to the mobile operator's business.

Figure 7: Security aspects of service provider networks.
(Source: Gigamon)

Realizing the Gigamon Economic Advantage: Flattening the Cost Curve

The Cost Curve Problem

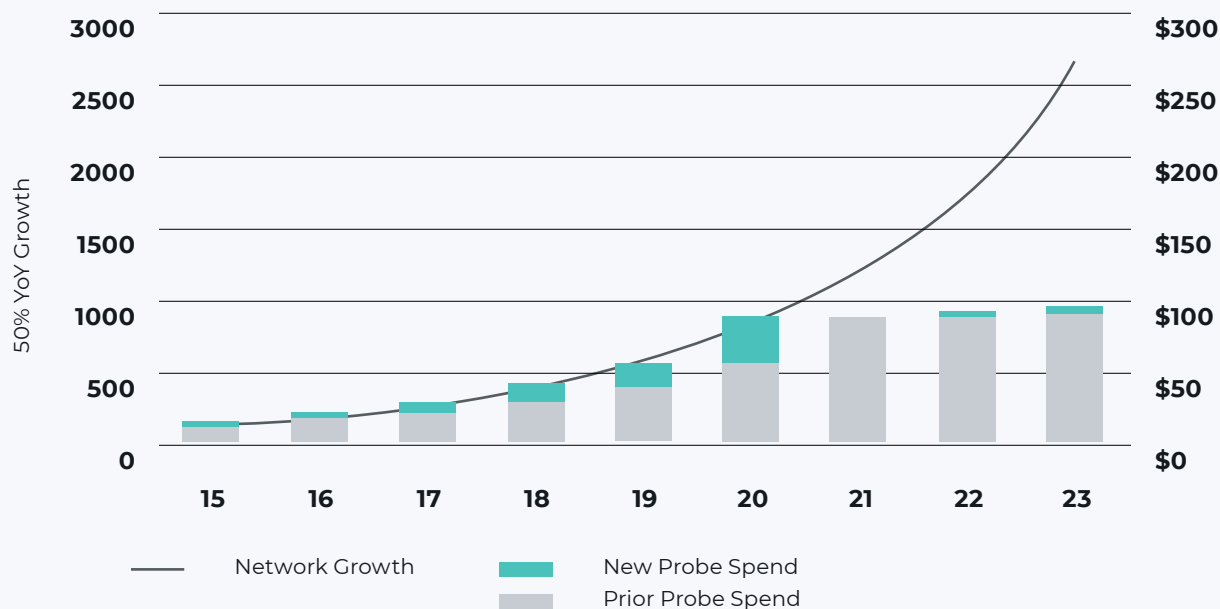As the network grows, probe costs grow in direct proportion

Figure 8: Flattening the cost curve. (Source: Gigamon)

There is a direct and proportional relationship between probe cost and probe throughput processing capability, as shown in Figure 8. This relationship is unsustainable, especially as traffic levels are expected to grow exponentially. As mobile operator revenue continues to be largely flat, a new approach needs to be found to break this unsustainable cost curve relationship. Ideally, any solution should not only increase mobile operator profitability, but also demonstrate increased business and service agility.

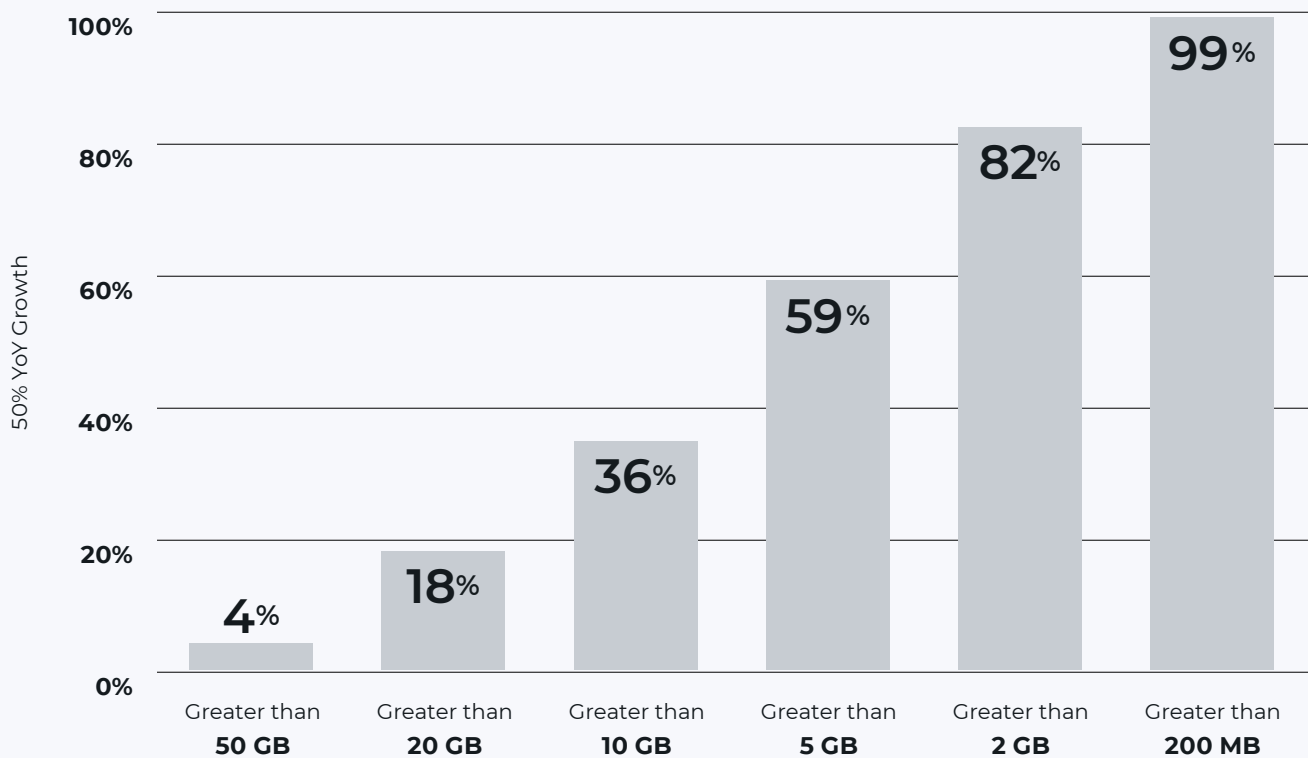Breaking the cost curve provides a clear competitive advantage to enable:

+ Focusing on highly profitable subscribers, traffic types and services

+ Optimizing the network's operation to capture profits

+ Orienting the business model for success, being ready for exponential traffic growth with flat or linear analytic tool cost growth

Subscriber Intelligence:
Not All Subscribers Are Created Equal

Percentage of Users

May 2019

50% YoY Growth

- Greater than **50 GB**: 4%
- Greater than **20 GB**: 18%
- Greater than **10 GB**: 36%
- Greater than **5 GB**: 59%
- Greater than **2 GB**: 82%
- Greater than **200 MB**: 99%

[5] Figure 9: Subscribers are not created equal. (Source: Cisco VNI)

Not all subscribers are created equal. Here we can see that 4 percent of mobile users consume 50 GB per month. It might not make great financial sense to collect and send all this traffic to the probes if the value of these subscribers cannot bear the cost of the analytic tools.

Historically — in 4G deployments, highly efficient mobile operators moved away from the model where all subscribers and all traffic were monitored — monitoring was only performed for subscribers who could bear that cost, or for specific populations of interest, such as those transiting a weak coverage area, and perhaps if a new handset was deployed and where there were active trouble tickets.

Monitoring capacity was tailored to fit the underlying economic capability afforded by the APPU — the average profitability per user. High-value subscribers would be included on a forwarding-list of subscribers to be monitored, and the remaining capacity of the probes would be consumed by a sampled population taken at random from the remaining subscribers on the network.

This approach allowed the mobile operator to experience the best of all worlds, keeping the probe costs under control, being able to see all subscribers in a population of interest, and having a "good enough" idea of any network and performance issues to extrapolate network conditions for the larger subscriber population.

The existing Gigamon Subscriber Intelligence monitoring solution has been widely deployed for 4G, and now supports communication protocols used to correlate the user plane and control plane traffic to enable coherent reduction and forwarding (including balancing) of traffic to the monitoring tools for 5G networks. The separation, dropping and forwarding of traffic can be based on subscriber ID, device ID, RAN ID, network slice ID or quality of service ID. Mobile operators can now reduce costs and deploy subscriber-aware monitoring systems to right size their 5G monitoring and security spend in advance of deploying.

However, reducing traffic with subscriber intelligence does have some drawbacks, because only highly valued subscribers are monitored, and maybe a subset of other subscribers if probe capacity allows. If a mobile operator requires all traffic to be monitored, then this approach may not meet those needs.
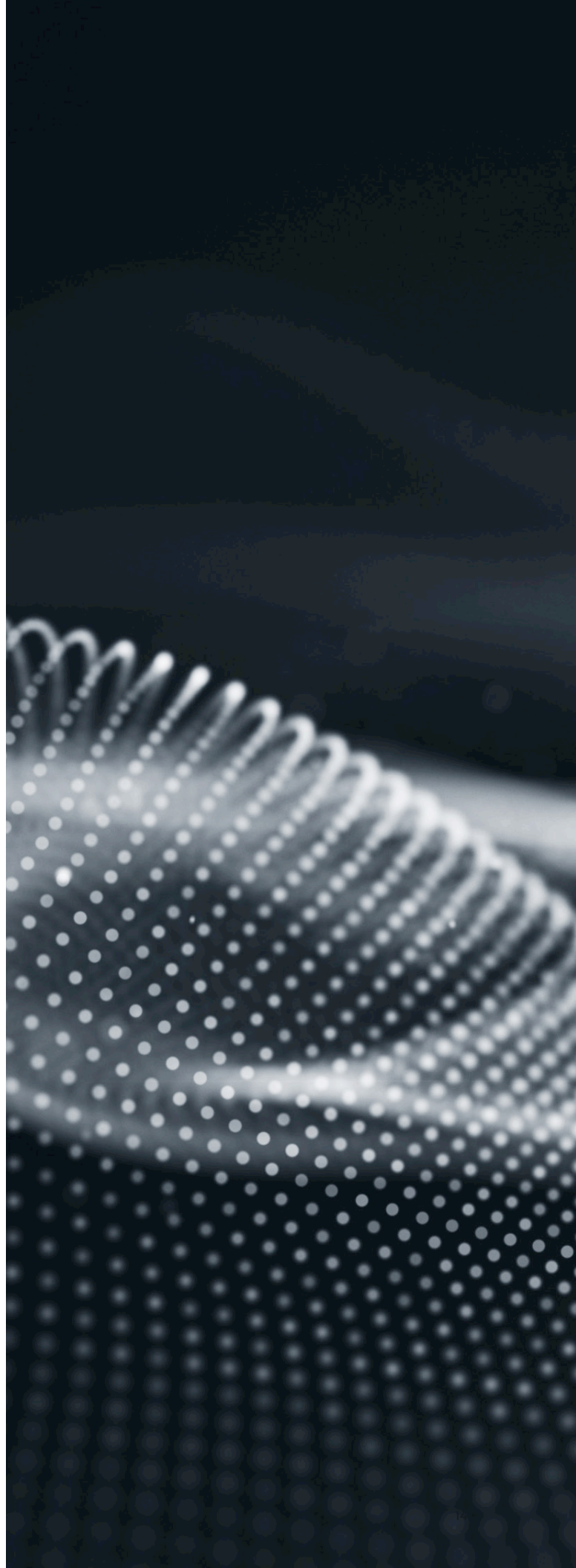
Enabling Subscriber Intelligence: 5G Correlation

In telecom networks, the control and user planes are often carried separately to increase network security, controllability, scalability and underlying efficiency of the network to carry the user plane traffic. A significant hurdle for the monitoring infrastructure is that the user plane tunnels are unidirectional, every user session has two tunnels, each tunnel ID is individually assigned and the user plane tunnels have no identifiers back to the user, device or radio access network (RAN). Therefore, coherently feeding traffic to attached tools or across tool instances while keeping user sessions together requires a level of sophistication that is provided by the 5G correlation capability.

To further reduce the amount of traffic to be monitored in 5G networks, subscriber-aware traffic-reduction functions are executed at the network edge, with session information held at the core across different geographies, through real-time session-to-subscriber mapping updates. In the below diagram, the user plane node (UPN) and the control plane node (CPN) are two functions that ensure the same traffic-reduction techniques can be applied to each session as the device or subscriber traverses the network in real time.
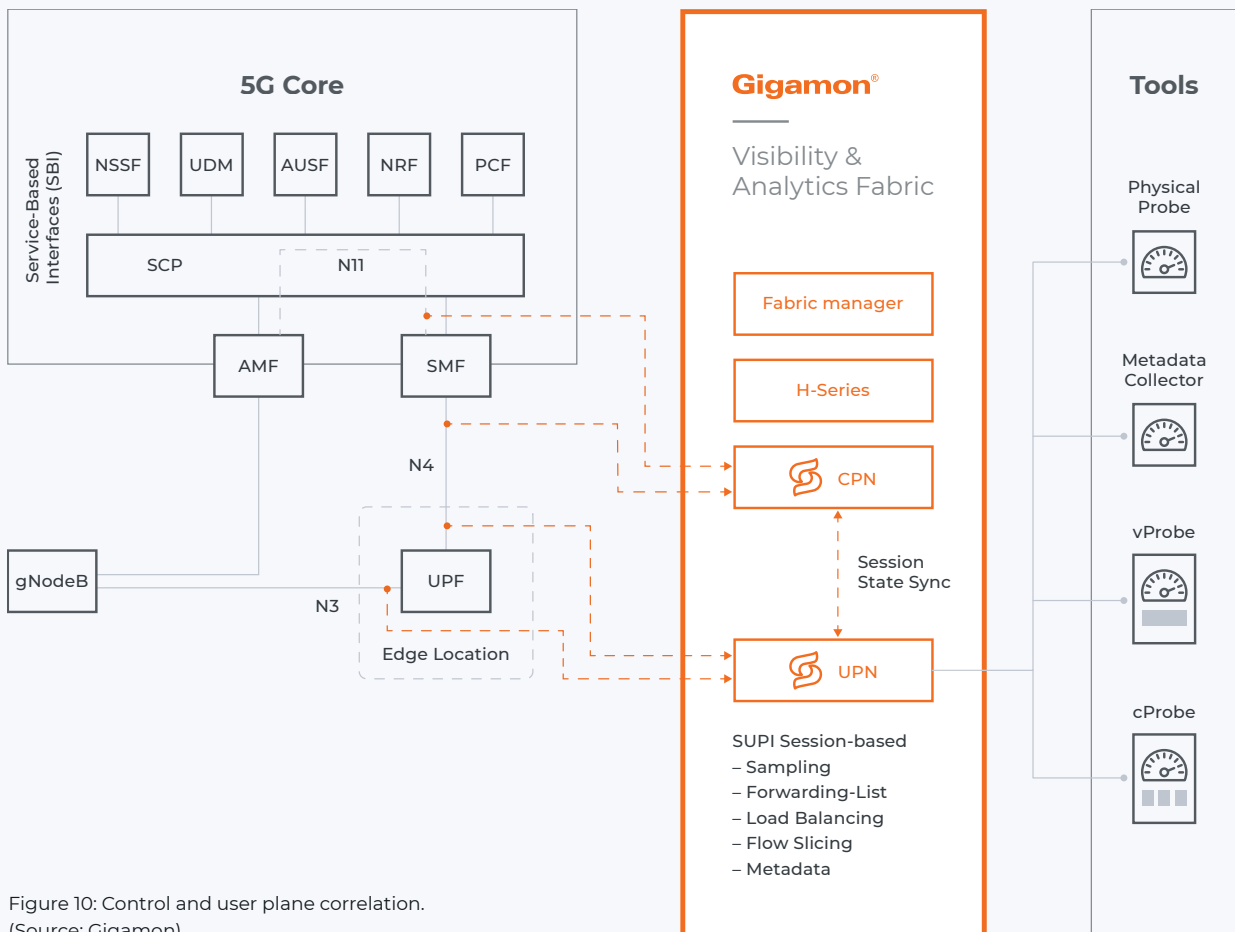
Figure 10: Control and user plane correlation.
(Source: Gigamon)

For a monitoring system to be effective, and for it to play a critical part in flattening the cost curve, 5G correlation performs these critical roles:

+ Collecting all user traffic, including traffic that is routed asymmetrically

+ Assigning the correct traffic to the correct subscriber

+ Keeping the user plane nodes (UPNs) in sync with the control plane node (CPN)

Only after the traffic is correctly correlated can subscriber-aware reductions in traffic be realized, and in turn the associated cost reductions achieved. Some analytic tools can perform these functions natively, but are hampered by the following inefficiencies:

+ A view of the entire network allowing traffic to be reduced at the network edge, as opposed to backhauling over the network for a probe to later discard. Low-priority traffic that doesn't need be monitored can be discarded close to the source, freeing up backhaul capacity for high-priority traffic.

+ Access to all packets and both directions of every session associated with each subscriber.

Correlation of the control and user planes opens the door to flattening the cost curve through innovative traffic treatments, which helps a mobile operator determine its network monitoring capability such that it is more efficient, more effective and ultimately less costly — and in turn improve the profitability of its business.

Traffic Intelligence:
Not All Subscriber Traffic is Created Equal

Traffic Intelligence from Gigamon offers a number of capabilities including several traffic-reduction techniques. One of them is a new innovation, Advanced Flow Slicing, tailored specifically toward high traffic volume deployments such as 5G, which focuses on the greater understanding of the traffic being carried by the network rather than directly focusing on the subscriber identity. This Traffic Intelligence capability targets the problem of exponential 5G traffic growth and overcomes several previous drawbacks.

Common concerns expressed by mobile operators

Why are we spending more money on probes?

That is too expensive. I don't think we can afford that.

$

How do I guarantee performance if I don't have the packets?

Network Performance

The network grew. We need to see all the packets.

We won't have effective security without all the packets!

Network Security

Figure 11: Common concerns expressed by mobile operators. (Source: Gigamon)

With this new approach, mobile operators can:

+ Monitor 100 percent of the subscriber base.

+ Remove packets where the content is not relevant — for example, un-decryptable HTTPS traffic.

+ Monitor the first leading number of packets (ten, for example) of certain flows, and then delete or slice the rest of each flow.

+ Reduce traffic volume, potentially by up to 75 percent, without compromising data fidelity. (Fidelity is based on headers, latency and jitter, not packet content.)

+ Make traffic-reduction percentage an input variable to the monitoring system.

Example of Traffic Intelligence

Advanced Flow Slicing

HOW IT WORKS

+ Send first few packets in a flow (most handshake info here)

+ Drop or slice subsequent packets
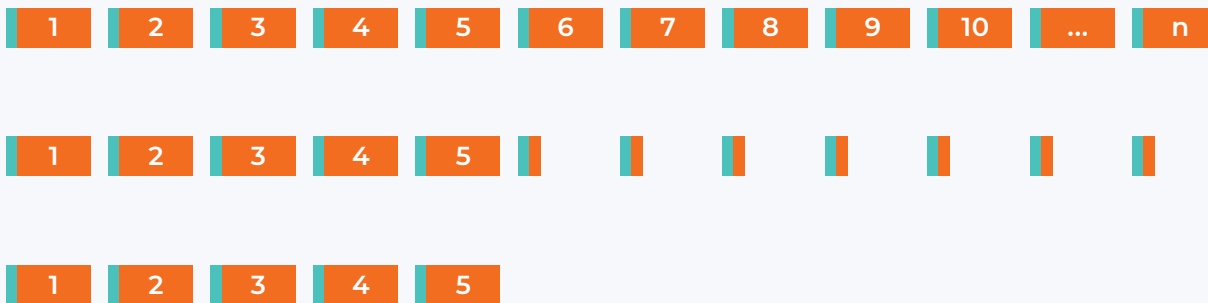
+ Configurable (20-25 common)

Figure 12: Example of Traffic Intelligence. (Source: Gigamon)

This new approach for 5G deployments brings true innovation and greater operational agility to mobile operators, preserving traffic processing fidelity while greatly reducing the amount of traffic to be processed — flattening the probe cost curve, helping to conserve operating budgets and profit margin.
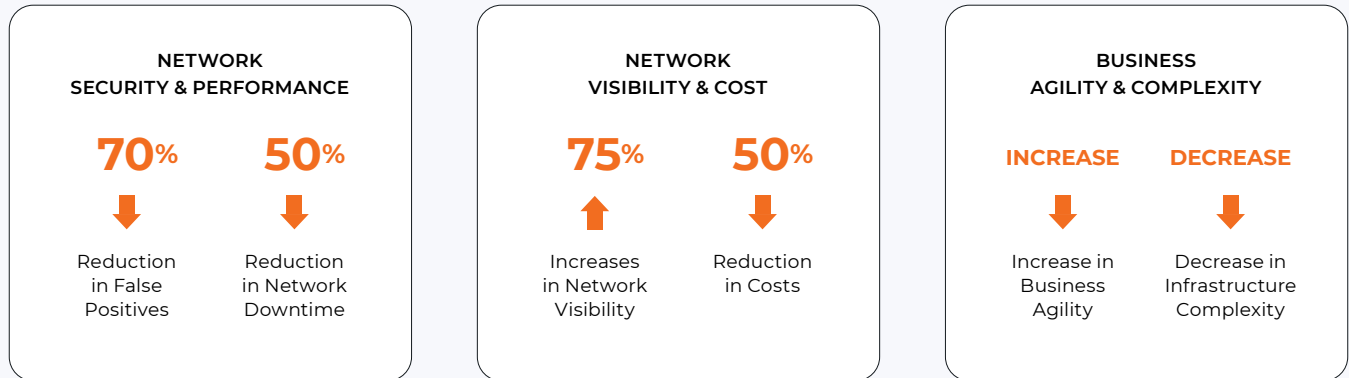
Further Traffic-Reduction Techniques

In addition to Subscriber Intelligence and Advanced Flow Slicing arrangements, Gigamon has developed a series of other traffic-reduction techniques that also work to reduce the burden of exponential traffic growth in 5G networks, helping to rationalize traffic levels going to the probes, comprehensively breaking the cost curve conundrum and reinstating a linear relationship between subscriber growth, analytic tool expense and bottom line profitability.

Policy	Potential Reduction	Description	Recommended Use Cases	GigaSMART
Application Filtering	**75**%	Filter packets belonging to trusted or high-volume applications (eg. YouTube, Netflix)	+ Security Monitoring + Performance Monitoring	✓
Advanced Flow Slicing	**75**%	Filter non-initial packets in a session flow	+ Security Monitoring + Performance Monitoring + Performance Troubleshooting	✓
Subscriber Forwarding-List	**99**%	Forward only packets belonging to specific subscribers or devices	+ VIP Users (exec, baseline, etc) + Customers calling Tech Support	✓
Subscriber Sampling	**90**%	Filter out a specified percentage of subscribers or subscriber sessions	+ Performance Monitoring	✓
De-duplication	**50**%	Filter out the "same" packet tapped at two locations	+ All Monitoring and Troubleshooting + Physical and virtual taps + Simplified tap/agg designs	✓
Protocol Filtering	**80**%	Loosely target traffic by filtering L4 protocols (eg. HTTPS -=TCP 443	+ Filtered app accurancy is not critical + GigaSMART not an option	
Active Visibility	**	Turns packet reduction on only under certain conditions		

Figure 13: Traffic-reduction techniques. (Source: Gigamon)

Spotlight on the Mobile Operator's Business

Gigamon Delivers Quantifiable Business Outcomes

NETWORK SECURITY & PERFORMANCE	NETWORK VISIBILITY & COST	BUSINESS AGILITY & COMPLEXITY
70% ↓ Reduction in False Positives **50%** ↓ Reduction in Network Downtime	**75%** ↑ Increases in Network Visibility **50%** ↓ Reduction in Costs	**INCREASE** ↓ Increase in Business Agility **DECREASE** ↓ Decrease in Infrastructure Complexity

"ESG customer interviews and conversations with industry analysts have consistently shown that the Gigamon platform is a critical tool for success in today's digital age." —ESG

Figure 14: Delivering quantifiable business outcomes. (Source: Gigamon)

Gigamon solutions enable the mobile operator to deploy 5G without breaking the bank. Gigamon solutions enable more effective, in-depth monitoring of the network, to prioritize the right traffic, the right devices, the right subscribers, the right services and the right applications, which will help to reduce costs and improve customer experience — which helps your business to be more successful. Other benefits such as finding faults faster, reducing outages and improving MTTR (mean time to repair) metrics can also be observed.

Consolidating probe cost: Fully featured Gigamon solutions not only reduce the amount of traffic going to a probe, but can also replace the entire probe, removing more cost from the operator's network.

The below points detail how a Mobile operator benefits from a Gigamon solution:

+ Need fewer probes and analytic tools: Solve feeds-and-speeds issues with reuse of existing tools; extend tool life; defer new capital investments.

+ Do more with the same, or less: Deploy freed up staff to concentrate on new investment areas; out-perform competition.

+ Focus on highly-profitable areas: Focus customer support on services/subscribers that can bear those costs. Separate out services, traffic types and subscribers by profitability.

+ Enable greater capital and operational efficiency: Monitoring is a central part of providing customer delight and lowering network/service rollout costs, as well as reducing subscriber acquisition costs.

+ Achieve greater agility with new and existing resources.

+ Attain higher network quality: Provides for a better reputation, which leads to lower cost of subscriber retention.

+ Deploy new services faster: Hone offerings to gain customer acceptance more quickly; faster path to network and service profitability.

+ Reduce acceptance testing of new network elements: Leads to faster service deployment and associated quicker path to service income.

+ Find faults quicker: Reduce MTTR; reduce service outages and misconfigurations through more comprehensive network visibility.

+ Improve focus on customer satisfaction: Provide executive management with curated operational and network efficiency metrics.

OPERATIONAL ADVANTAGES:

+ Focus on populations of interest: Orient the business to most profitable customer segments — B2B, B2C

+ Focus on most profitable endpoints, services, subscribers: Overcome endpoint proliferation

+ Deploy new services with the same level of staffing: Do more with less

+ Separate out services by profitability

+ Need less/same amount of resources to monitor and manage more of the network

+ More agile use of existing and new resources

+ Repurpose existing hardware to support new offerings

+ Do more with less: Take on new projects/ achieve performance metrics set by executive management with demonstrable proof

COMPETITIVE ADVANTAGES:

+ Lowered network running costs: Minimized network complexity, reduced outages

+ More agile and efficient workforce: Helps to reduce stovepipes and fiefdoms

+ Lowered customer support costs

+ Higher network reliability

+ Better management oversight and alignment

+ Lowered customer acquisition resistance: Results in lowered customer acquisition costs

+ Higher network reliability provides for more time/resources to focus on the "next big thing": Creates opportunity to gain further efficiencies

+ Operational savings: Allow budget redirection for advertising, network upgrades, subscriber programs and subscriber givebacks, as well as overall subscriber acquisition efforts, gaining a competitive advantage

+ Greater confidence over budget cycles and business planning

A deployed monitoring solution not only helps the mobile operator to deploy 5G more effectively as well as speed up the ability to get to market faster, but it also offers insight into efficiencies for the mobile operator's business — how the business can be run more effectively, efficiently and profitably over the long haul.

Conclusions

5G employs a high degree of new technology, network automation, new radio frequency bands, new service offerings, new traffic types, new devices, new use cases and (most importantly of all) new subscriber expectations. In this paper we have examined the impact 5G will have on a mobile operator's ability to deploy and run its network in an efficient, secure and economically savvy manner. We have looked at the expected issues a mobile operator will face and how monitoring can enable successful business outcomes, including large cost savings when mapped against 5G deployment goals. Recapping:

+ 4G will continue to be vital — the revenue and bandwidth work horse in the near term. 4G will continue to need support, and for customer service levels to be maintained. As 5G is being built out during the medium term and subsequently turned up with subscriber migration programs, a great strain will be placed on mobile operators' resources. Thus there is a need to do more with less and to preserve capital expenditure. Deploying a Gigamon solution directly helps to achieve this goal.

+ New architectures and transport mechanisms based on software-defined technologies will be put through their paces for the first time – this will be challenging. New demands will be placed on existing staff who may be unfamiliar with the analytic tools needed to debug and correct complex software-based problems, creating a greater need for vendor support and an inevitable emphasis on defining demarcation points between equipment functions versus vendor responsibility, and a need to put in place independent operational verification capabilities.

+ The amount of traffic generated by subscribers through new service offerings, new devices such as autonomous vehicles, and new use cases, such as delivering UHD video over mobile broadband to the home, may spiral out of control in the early days of full 5G deployments; the demands placed on the network will be staggering. Many of these new devices and services will require real-time/low-latency network access to prevent life-and-limb injuries to subscribers and will drive huge data spikes from video content downloads, quickly driving edge processing costs up.

+ Mobile operators will need mechanisms to generate meaningful metrics upon which to improve their networks and services and to lay the foundation on how to compete for subscribers as 5G services deploy and migration programs start. OpEx and CapEx constraints will force operators to make hard decisions on where to invest, and must be based on real-world information derived from those operational metrics. Monitoring will play a critical role in determining the metrics and the associated decisions.

+ The mobile operator will continue to need to do more with less in order to stay relevant, to compete and to continually offer up the new services subscribers want at a quality level they find acceptable — all at a price point that is attractive to the subscriber and profitable to the operator. Subscribers may find 5G confusing due to ever-present marketing hype, and churn metrics need to be understood, analyzed and acted upon in real-time. Monitoring is a vital part of managing this effort.

+ Flattening the cost curve relationship between subscriber and traffic growth and the increasing cost of probes and analytic tools must be taken seriously. Specifically, data processing and data storage costs associated with tooling functions need to change. A highly desirable cost basis that is in line with a mobile operator's business model would be a near flat tool cost curve that supports the exponential 5G traffic growth curve. Gigamon solutions can enable a mobile operator to realize that model today.

A comprehensive monitoring system can help to alleviate and, in many cases, solve the above issues. Through monitoring, Mobile operators can do more with less, can run their business more efficiently and effectively, they can address issues that would otherwise lead to churn and deploy new technologies in a managed way while meeting subscriber cost models as well as subscriber quality and customer service expectations.

[1] https://www.cisco.com/c/dam/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.docx/_jcr_content/renditions/white-paper-c11-741490_23.png

[2] https://www.cisco.com/c/dam/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.docx/_jcr_content/renditions/white-paper-c11-741490_34.png

[3] https://www.cisco.com/c/dam/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.docx/_jcr_content/renditions/white-paper-c11-741490_8.png

[4] https://www.cisco.com/c/dam/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.docx/_jcr_content/renditions/white-paper-c11-741490_2.png

[5] https://www.cisco.com/c/dam/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.docx/_jcr_content/renditions/white-paper-c11-741490_16.png

About Gigamon

Gigamon is the first company to deliver unified network visibility and analytics on all data-in-transit, from raw packets to apps, across physical, virtual and cloud infrastructure. We aggregate, transform and analyze network traffic to solve for critical performance and security needs, including rapid threat detection and response, freeing your organization to drive digital innovation. In short, we enable you to run fast, stay secure and innovate.

Gigamon has been awarded over 75 technology patents and enjoys industryleading customer satisfaction with more than 3,000 organizations, including 80 percent of the Fortune 100. Headquartered in Silicon Valley, Gigamon operates globally.

For the full story on how Gigamon can help you, please visit www.gigamon.com.