

GTP Correlation

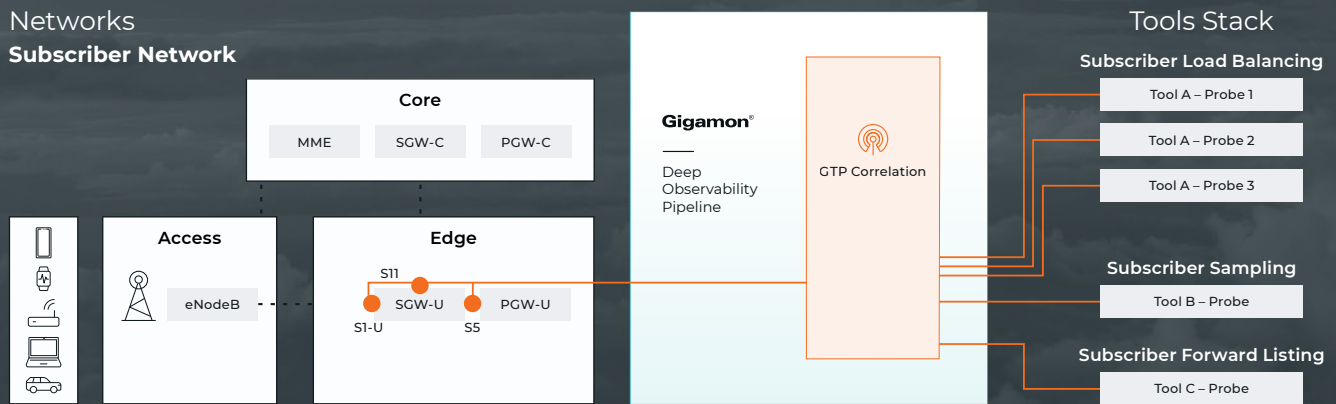


Figure 1. GTP Correlation.

Challenges in Today's 3G, 4G/LTE, and Traffic Visibility

As data traffic from mobile devices and applications continues to grow exponentially, mobile carriers have searched for a way to efficiently and effectively monitor performance and quality of experience (QoE) for their subscribers, as well as identify and monetize new offerings.

However, in order to ensure accurate, cost-effective analytics from their tools infrastructure, service providers are dependent on two critical components:

- Visibility across all segments of the mobile core network, whether physical or virtual
- Ability to correlate traffic flows on a per-subscriber or network basis to deliver coherently to monitoring and security tools

GTP Correlation

GPRS Tunneling Protocol (GTP) is used to carry mobile data within the core of the mobile operator's network. GTP uses both control plane protocol (GTP-c) and user plane protocol (GTP-u) to carry subscriber application traffic from the subscriber device to the internet. Visibility into a subscriber's traffic requires the ability to understand the subscriber attributes and stateful information contained within the GTP-c (v1 and/or v2) to correlate subscriber-specific GTP-u traffic so that monitoring tools can achieve an accurate view of the subscriber's traffic on the network.

The Gigamon GTP Correlation application helps carriers gain access to the subscriber's traffic in these GTP tunnels by reliably correlating and passing all of the identified subscriber's control and data sessions to the analytics/monitoring probes and/or billing subsystems to ensure an accurate view of the subscriber sessions (see Figure 1).

Further, given the rate of increase in the volume of information traversing through the mobile service provider network, the tools infrastructure has been unable to scale accordingly, and proliferating tools across the network to monitor millions of subscribers can be very expensive and cost prohibitive on both a CapEx and OpEx basis.

With the Gigamon GTP Correlation application, mobile operators can install a monitoring policy within the Gigamon Deep Observability Pipeline that will intelligently deliver subscriber traffic to the specific tools. It does this by correlating the subscriber-specific attributes, including the subscriber ID, also known as the International Mobile Subscriber Identity (IMSI); device ID, also known as the International Mobile Equipment Identity (IMEI); subscriber endpoint number, also known as the Mobile Subscriber – Integrated Services Digital Network (MS-ISDN); and mobile core interface (Gn/Gp, S1U/S11, S5/S8), where the session is carried; and other GTP-c-related attributes that are exchanged as part of the control sessions. All subscriber device user plane traffic is carried within GTP-u tunnels, which are identified within the GTP-c protocol as GTP tunnels, also known as Tunnel Endpoint ID (TEID). Once the GTP-u TEIDs are known and correlated to the subscriber-level attributes, then subscriber traffic can be processed in a subscriber-aware manner. With this capability, the deep observability pipeline using GTP Correlation leverages a mobile subscriber-aware monitoring policy, and can optimize current tool infrastructure investments by providing only relevant data to the tool while increasing visibility into subscriber traffic that can help improve QoE and performance.

GTP Correlation enables important subscriber-aware features that optimize traffic monitoring:

- The first is GTP Subscriber Filtering, whereby subscriber traffic can be selected and forwarded to monitoring tools utilizing attributes including subscriber information such as, IMSI, IMEI, or MSISDN; or GTP session information, such as GTP version or mobile core logical interface (Gn/Gp, S1U/S11, and S5/S8).
- The second is GTP Load Balancing, whereby all GTP sessions are load balanced to as many as 16 tool ports utilizing IMSI based load-balancing criteria.
- The third is the Gigamon GTP correlated FlowVUE® traffic sampling application. GTP correlated FlowVUE ensures that 100 percent of traffic for a sampled subset of subscribers can be forwarded to monitoring tools, allowing the traffic to be scaled to fit the existing tools. FlowVUE also allows the operator to allocate separate (and possibly overlapping) samples from a common pool of traffic data to each tool.
- Finally, the Gigamon GTP forward-list feature allows a defined list of high-value subscribers (up to 2 million) to be chosen to receive full-time monitoring, even with GTP correlated FlowVUE processing enabled.

GTP Correlation can be combined with other GigaSMART® traffic intelligence applications like Application Filtering Intelligence, for example, which enables monitoring tools to perform more efficiently by eliminating entire sessions of unwanted traffic. The Gigamon GTP Correlation application also has the ability to ensure that all IP fragments within the subscriber session are sent to the same tool.

When used with FlowVUE, an application for intelligent scaling of active subscribers, carriers can have a representative view of a subscriber's usage patterns. Armed with these subscriber-level insights, Gigamon products can help operators to identify roaming subscribers across peered networks through IMSI filtering.

By gaining a complete activity view of high-value subscribers, carriers can look to:

- Optimize average revenue per user (ARPU) by improving operational efficiency, which allows the carrier to better compete with their in-market competitors on an expenses basis
- Ensure business continuity and QoE
- Identify and monetize new offerings

GTP CORRELATION FEATURES

- Stateful filtering based on subscriber IDs (IMSI)
 - Stateful correlation of GTP-c with GTP-u messages
 - Correlation of subscriber ID with corresponding tunnel ID
 - Forwarding of subscriber-specific control and user plane sessions to a tool or a group of tools
- Traffic filtering, replication, and distribution based on:
 - GTP TEID and inner-packet parameters, including: Src/Dst IPv4/v6 addresses, protocol, Src/Dst port, IP version, TOS, TTL, DSCP, fragmentation flags, TCP flags
- Supports LTE and 3G networks including GTPv1 and GTPv2
- Supports the use of the APN and QCI attributes as criteria for FlowVUE and GTP forward-list features, allowing traffic to be routed to different tools or discarded based on the type of network connection the device has requested
- Supports the allocation of separate samples for each tool port or tool port group from a common pool of correlated control and user plane data as part of FlowVUE and GTP forward-list features

KEY BENEFITS

- Optimize the tools infrastructure
 - Optimize tools processing by accurately filtering, replicating, and forwarding monitored subscriber sessions
 - Reliably correlate subscriber sessions (control and data) to increase analytics accuracy
- Pervasive visibility into subscriber traffic
 - Extend visibility and proactively identify service issues impacting (and frustrating) subscribers
 - Facilitate drilldowns into roaming users across peer networks
- Maximize quality of experience and monetize services
 - Gain pervasive subscriber-level visibility and empower monitoring tools to gauge end-user QoE
 - Utilize real-time stateful visibility to enable reliable accounting, billing, and subscription management

- Make the transformation to a unified tool rail possible
 - Cost-efficiently correlate GTP at the visibility layer instead of needing a GTP Correlation license for each attached tool, across multiple different tool vendors
 - Ensure that each tool receives identical GTP correlated traffic to help decrease the MTTR and reduce attached tools results ambiguities
 - Allow the results of all attached tools to be better correlated together, improving insights by increasing accuracy and precision
 - Distribute unique samples to each attached tool based on the tool's requirement to study specific traffic and the type of network connection requested.

Rethinking Operator Infrastructure Monitoring with Subscriber-Aware Visibility

GTP Correlation enables user and data plane correlation. After correlation, both the user and data plane traffic can be directly sent to the tools when the primary objective is offloading tools from the overhead of GTP correlation. The Gigamon solution goes much further than just tool optimization. It is one of the core building blocks for operators looking to build a best-in-class, modern, subscriber-aware visibility platform, as shown in Figure 2 below.

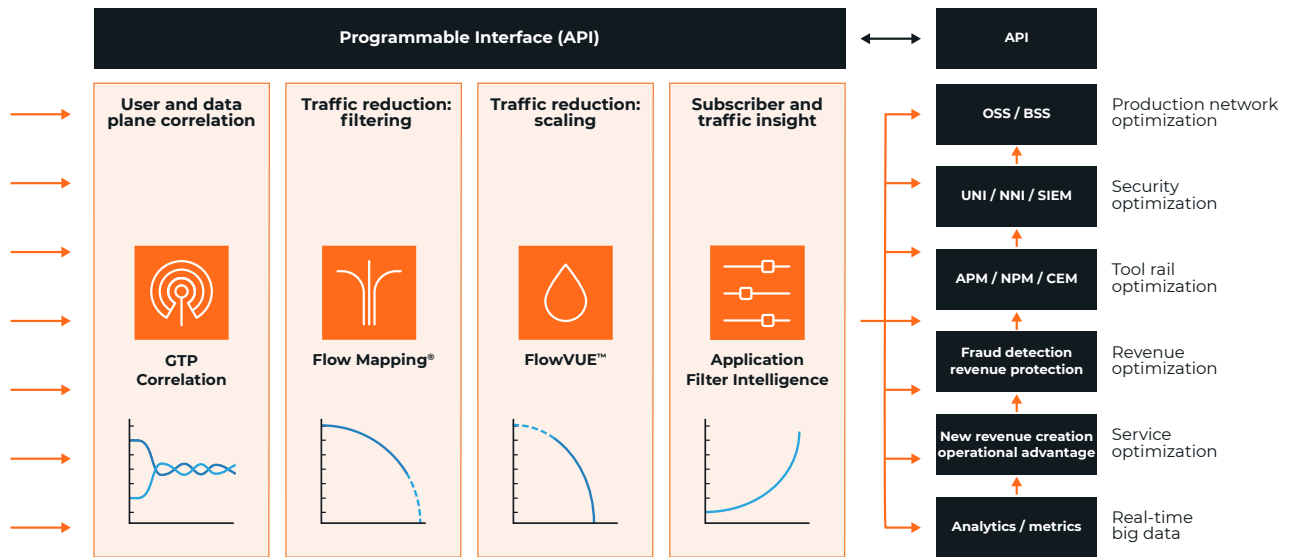


Figure 2. An example of a best-in-class, modern, subscriber-aware visibility platform.

By combining GTP Correlation with other traffic intelligence capabilities in the Gigamon Deep Observability Pipeline, operators can gain deep insights into their networks and both:

- Optimize their per-subscriber monitoring cost
- Offer new services that increase the average revenue per user

This is done with tiered monitoring strategies that separate higher-ARPU subscribers from lower-ARPU subscribers.

Such an architecture enables operators to scale their traffic to meet their tools processing throughput. Forwarding allows all traffic from specific IMSIs to be sent to the tools, whereas sampling selects a configurable set of user sessions for analysis. Both forwarding and sampling are part of the FlowVUE application in the GigaSMART suite of traffic intelligence applications offered by Gigamon for mobile operators. These capabilities can be used by operators in a variety of ways to implement highly scalable and efficient monitoring methodologies. Some examples are:

- Prevent entire application sessions corresponding to voluminous over-the-top (OTT) traffic such as YouTube, Netflix, and other video sites from reaching the tools, eliminating expensive and unnecessary upgrades to the tooling infrastructure
- Send only a sample of non-premium sessions to the monitoring tools for analysis
- Send different (possibly overlapping) samples to different monitoring tools
- Sample a set of sessions to analyze the quality of service at a particular cell site
- Send traffic to tools based on requested network connection, such as IMS for VoLTE by using APN and QCI as selection criteria

Pervasive Visibility with a Deep Observability Pipeline

In this era of big data, mobile carriers have searched for a way to efficiently and effectively monitor performance and QoE for their subscribers, as well as identify and monetize new offerings. Converging on a single visibility platform that not only simplifies and automates network traffic visibility but also provides built-in intelligence to address big data will shape how mobile carriers choose to monitor and manage their network to provide better, faster connections and new services, while increasing operational efficiency and network uptime.

Legacy approaches to monitoring have offered limited traffic visibility with limited filtering capabilities, are difficult and costly to scale and manage, and often require change orders or network downtime in order to adapt to the evolving network.

Gigamon products provide the architecture and intelligence for mobile operators to create a monitoring infrastructure that is designed for the new era of big data and deliver pervasive visibility, awareness, and control from the converged edge to the cloud. Sitting between the IT infrastructure and the tools that need the access to data, the Gigamon Deep Observability Pipeline provides a holistic approach to traffic visibility that includes:

Architecture Advantages: The GigaVUE® family of visibility nodes offers the volume, port density, and scale needed to connect the right analytical tools to the appropriate large or bonded pipes. Tool trials are streamlined, new tools can easily be added or removed, and uptime is protected while downtime is prevented with a solution that is outside the production network and provides pervasive visibility.

Feature Advantages: Advanced filtering, packet manipulation, and session-aware traffic identification reduce the amount of data arriving at each tool while ensuring that the data is formatted precisely for the tool's consumption. Each tool is optimized by not needing to parse the incoming stream or waste processor cycles on non-relevant data, so it can focus on the more important task of data analysis.

GigaSMART Applications: Traffic intelligence and management applications provide effective monitoring of big data through the logical reduction of traffic so that it is more suitable to connect to an existing tool at 1Gb or 10Gb. The Gigamon GTP Correlation enables visibility at the subscriber/session level in order to maximize QoE and monetize services. The FlowVUE application intelligently manages big data traffic through active subscriber-aware flow sampling while keeping data flows intact.

About Gigamon

Gigamon offers a deep observability pipeline that harnesses actionable network-level intelligence to amplify the power of observability tools. This powerful combination enables IT organizations to assure security and compliance governance, speed root-cause analysis of performance bottlenecks, and lower operational overhead associated with managing hybrid and multi-cloud IT infrastructures. The result: Modern enterprises realize the full transformational promise of the cloud. Gigamon serves more than 4,000 customers worldwide, including over 80 percent of Fortune 100 enterprises, 9 of the 10 largest mobile network providers, and hundreds of governments and educational organizations worldwide. To learn more, please visit gigamon.com.

For more information about the Gigamon Deep Observability Pipeline, visit gigamon.com.