



Taking Policy to the  
Smart Connected Device

# Contents

Introduction .....	3
Optimising Quality of Experience with Client-based PCEF .....	4
Chatty Applications .....	6
WiFi Offload and Distributed ANDSF .....	9
Network Service Assurance .....	12
Parental Control and Security .....	15
Over-The-Top Policy Management for MVNO's .....	17
Battery Saving .....	20
Real-Time Multimedia .....	22
VoLTE .....	24
Aggregated M2M .....	26
Glossary .....	28

# Introduction

Network operators face an unprecedented demand for next generation services while continued growth in data traffic threatens to overwhelm their networks.

With this surge in demand comes a complex set of challenges that network operators have to face.

- How to guarantee the delivery of high value services while at the same time using their infrastructure efficiently?
- How to protect revenue-generating services from non revenue-generating traffic that congests the network and competes for resources?
- How to evolve sophisticated pricing and personalisation plans to meet the demands of a new generation of users?
- How to measure and monitor the actual user experience in a way that supports customer care activities?

Traditional approaches don't meet these challenges. Cost conscious operators can't simply build themselves out of the problem by deploying new infrastructure. Instead, there has been considerable investment in the development of a new policy control architecture and the creation of a granular approach to enable policy delivery from different standards organisations.

Elements such as the PRCF / PDF / PDP, which handle events and make decisions as a result, have been conceived and introduced to control policies. These are complemented by the PCEF / PEP, which enforce the policies in the network. The framework continues to be extended, with the introduction of TDF, ANDSF and additional entities and standardised interfaces for inter-functional communication. These are supported by DPI solutions to analyse and control traffic.

But despite this on-going evolution, DPI and the entities involved in policy delivery are not enough. They don't provide the level of visibility and control required to truly manage the network from end-to-end.

The solution is to go beyond the traditional network boundary and take control at the client device, to see and manage traffic before it reaches the network.

GoS 360° is a unique solution that consists of an embeddable GoS Agent software client in the device and a centrally deployed GoS Manager. The GoS 360° solution can be used to ensure traffic is identified, prioritised and controlled at client devices, ensuring full visibility of user experience, service optimisation and the most efficient use of bandwidth.

This paper describes a number of use cases in which deployment of GoS 360° can uniquely solve data problems for network operators.

# Optimising Quality of Experience with Client-based PCEF

## Challenge

The 3GPP framework architecture for Policy and Charging Control specifies the PCRF and other essential elements, such as the PCEF and TDF. The PCEF is concerned with reporting user-initiated events and enforcing relevant policy decisions made by the PCRF, while the TDF detects and manages traffic. As such, the PCEF and TDF are critical entities for ensuring optimal user experience. The current 3GPP architecture proposes deployment of the PCEF/TDF functions in the network.

However, growing consumer demand for smart phones, coupled with the continuing performance growth of such devices, means mobile users are increasingly using applications that make bandwidth and connection demands of the carrier network. Maintaining Quality of Experience for users is increasingly difficult. Network-based deployments of the PCEF / TDF can only respond to up-stream traffic after it has left the RAN and entered the network, and cannot fully protect against contention for resources in the RAN itself.

## Solution

The solution is to extend policy control (PCEF and TDF) to the mobile device. The combination of the PCEF with the TDF on a user device delivers complete visibility of user traffic and application demands to MNOs, enabling them to have more optimal policy control. In addition, the improved visibility of what the user experiences ensures the correct policy can be applied under control of the PCRF, allowing MNOs to optimise user Quality of Experience in real-time and for different application demands.

Device-based PCEF is the only way in which MNOs can accurately measure and manage the user Quality of Experience within their overall policy control framework. The GoS 360° product consists of a network based manager component for interfacing to a PCRF, and a device based Agent. The GoS Agent combines PCEF and TDF functionality, enabling policy control directly to the mobile device, while the network-based manager offers a simple and scalable way for managing large numbers of devices in conjunction with the PCRF.

This architecture enables GoS360° to provide a highly scalable platform based on future-proof investment supporting a wide range of use cases, as opposed to delivering a dedicated application per solution.

## Benefits

By deploying GoS 360°, MNOs can:

- Enhance and complement network-based PCEF solutions
- Leverage the scalable “power” of mobile devices in policy decisions
- Manage up-stream traffic before it reaches the network
- Control signalling load in the RAN, ensuring more efficient use of radio bandwidth and UE battery life

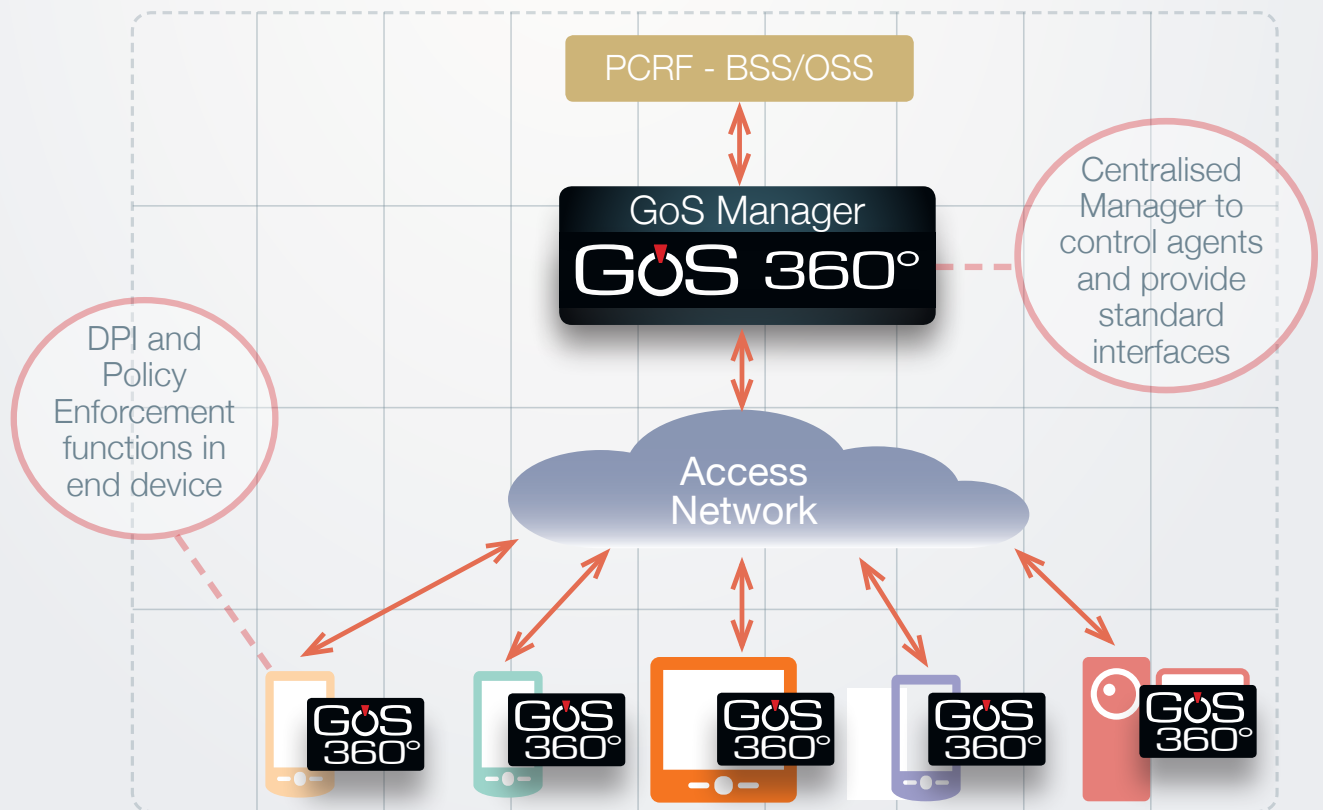
# Optimising Quality of Experience with Client-based PCEF

## Benefits (continued)

- Reduce signalling load to make CAPEX savings in the RAN
- Obtain a complete, real-time view of application performance on the user device, leading to improved customer care and support
- Optimise user experience on the device
- Deliver application and user specific policies to client devices

## Examples

- Prioritise real-time traffic from different applications
- Rich Communications Suite (RCS)
- Gaming
- Video communication and collaboration
- On-demand streaming services
- Mobile broadband access via dongles
- RAN signalling traffic reduction



GoS 360 Distributed Traffic Detection and Policy Enforcement

# Chatty Applications

## Challenge

The huge growth in the adoption of smartphones has been accompanied by a similar upsurge in the proliferation of applications. A large number of these applications are free and leverage in-application advertising to create revenue opportunities for developers.

However, many of these applications are not optimised for the mobile environment and are set to send frequent updates to servers in the network, even when the application is in the background. The updates may be to provide location data or simply to poll servers for the latest advertisements.

Users are unaware of the traffic and its effects. The impact of this traffic can be compounded as users add applications to their portfolio. The problem is particularly acute in Android-based smartphones, as there are more ad-funded applications for this OS, but it is common to all.

This activity generates considerable traffic and leads to strain and congestion in the RAN. In extreme cases, the level of activity can even lead to network collapse. Network and RAN based traffic management solutions can only act once the traffic has left the user device, with the result that, by the time traffic reaches the network, the problem has already occurred.

MNOs have to cope not only with expected RAN traffic and demand but also this unexpected and difficult to forecast activity. They must invest heavily in both CAPEX and OPEX to avoid problems caused by such chatty applications as today's network-based solutions cannot solve the problem.

## Solution

The solution is to use the GoS Agent to extend PCEF functionality to mobile devices and manage signalling traffic from chatty applications. By deploying the GoS Agent, a lightweight mobile client in smartphone devices, to detect this traffic, network based policy solutions such as the PCRF can be given the visibility to enable them to manage such background activity. The mobile client is deployed via OTA updates or natively embedded in the device, and connects to existing policy resources via standard interfaces.

Many Chatty Application solutions and battery saving applications turn off radios and suppress access to the network based on simple and crude policies, for example by blocking all background applications or through 'black' and 'white lists' controlled by operators and users.

Unlike these, GoS Networks' solution deploys intelligent, patent-pending algorithms that have been proven to reduce signalling load on average by 30% and increase battery life by up to 50%, but at the same time allow all applications equal and fair access to network resources in order to maintain background information updates. GoS 360° does not negatively impact users' experience.



# Chatty Applications

Instead of allowing unnecessary unlimited traffic from applications that are in the background and not in use, MNOs can set intelligent policies to limit the frequency with which they contact remote servers. When the application is brought to the foreground, it can be permitted to resume its normal signalling frequency.

GoS Networks' GoS 360° solution for Chatty Applications has been deployed in volume, saving a major tier 1 mobile operator up to \$45 Million in deferred RAN expenditure, that releases capacity and improves user experience. It gets intelligently controlled application access to the network without impacting user experience.

With the GoS Agent and the mobile PCEF solution, MNOs have full visibility and control of traffic in the RAN from smartphone devices, enabling them to gracefully manage network capacity.

## Benefits

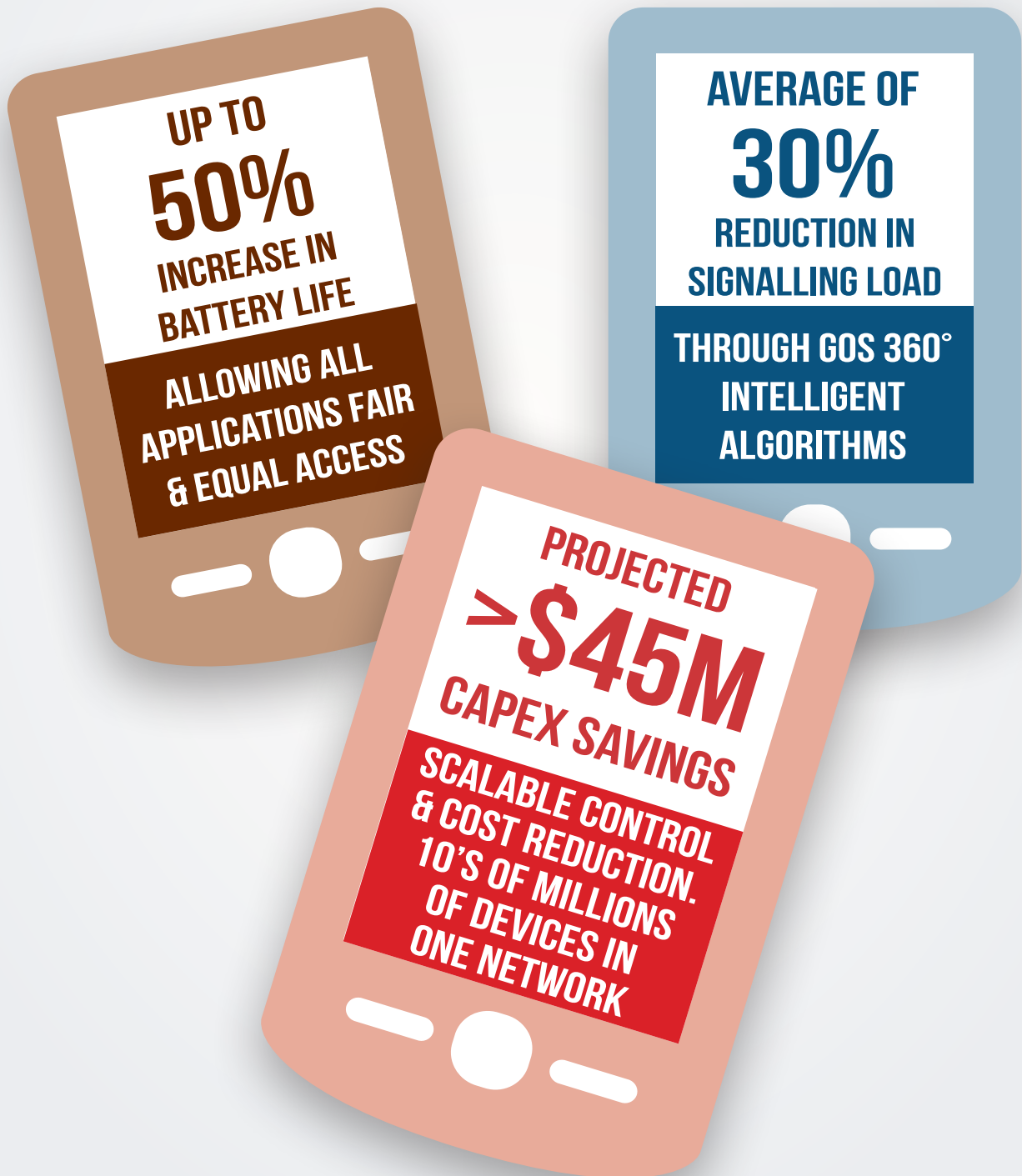
- Complements other battery saving techniques such as fast dormancy to assure the best possible user experience without resulting in race conditions between handset FD timers and background applications that generate additional signalling traffic
- Saves money, not just networks. Through our intelligent algorithms we can suppress and avert signalling storms generated by combinations of poor application and OS design that have led to network outages.
- Provide a framework for additional use cases and benefits

GoS 360° provides the only way in which network operators can intelligently prioritise application traffic at source, before it traverses the network.

## Examples

- Managing signalling load from chatty applications
- Managing RAN overhead and congestion
- Optimising foreground applications
- Ensuring the best user experience

# Chatty Applications





# WiFi Offload and Distributed ANDSF\*

## Challenge

With continued growth in mobile data traffic, MNOs are exploring ways to relieve network congestion and optimise the user experience. While there are many ways to accomplish this, one such involves increased use of non-3GPP networks, such as WiFi in conjunction with conventional 3GPP access networks.

Today, MNOs are researching the possibility to route traffic between different access networks, depending on the availability and occupancy of 3GPP and WiFi networks and the needs of individual applications.

While this can be accomplished statically, in which case the decision between access networks is a binary choice, dynamic mechanisms offer potentially greater utility value.

The use of WiFi for traffic offloading at or within the RAN has been adopted by MNOs for some time, but the ability to perform this task dynamically, in real-time and according to the needs of the user and application is significantly more complex. What's more, many users have opted to use WiFi access unilaterally. While such activity may require user intervention and hence not be seamless, the result is that MNOs' role in the value chain could be diminished.

MNOs need a solution that delivers the optimal network connection seamlessly from those available, while optimising the user experience and taking a leading role in simplifying and facilitating user choice. MNOs need flexibility.

## Solution

The solution is to deploy a new entity, standardised by 3GPP, known as the ANDSF. The ANDSF enables policy on the smart connected device that allows both automatic switching to non-3GPP access in binary mode (ISMP mode) and, subject to implementation, enables dynamic selection of the optimal access mode on a per application and traffic type basis (ISRP mode). This enables the MNO to offer optimisation services on behalf of its customers, actively selecting the most suitable network connection on a per session basis, under the direction of network policies.

GoS Networks' ANDSF solution adopts the innovative step of decomposing the functionality between the GoS Agent and GoS Manager. The GoS Agent acts as distributed ANDSF client that can be deployed on mobile devices (UE), while the GoS Manager provides co-ordination, policy administration, distribution and backend database functionality securely in the network, managing all active distributed ANDSF clients via the S14 reference point.

The ANDSF is responsible for collecting local information from each client and enforcing the relevant policy, taking into account:

- Inter-system mobility policies (ISMP);
- Inter-system routing policies (ISRP); and
- Discovery information.

\* ANDSF - Access Network Discovery and Selection Function

# WiFi Offload and Distributed ANDSF

Additionally, the GoS Agent distributed ANDSF client is able to identify applications and traffic types; local conditions such as performance of different access networks; and enable per-session connectivity management, through the application of ISMP / ISRP policies. Transfer and registration between networks can be achieved seamlessly, without additional registration requirements.

By deploying distributed ANDSF clients under the co-ordination of a central server in combination with GoS Networks' distributed PCEF functionality, service providers can establish a range of policies to meet the dynamic needs of the network and users, obtain visibility and control of local conditions and increase user satisfaction and customer experience.

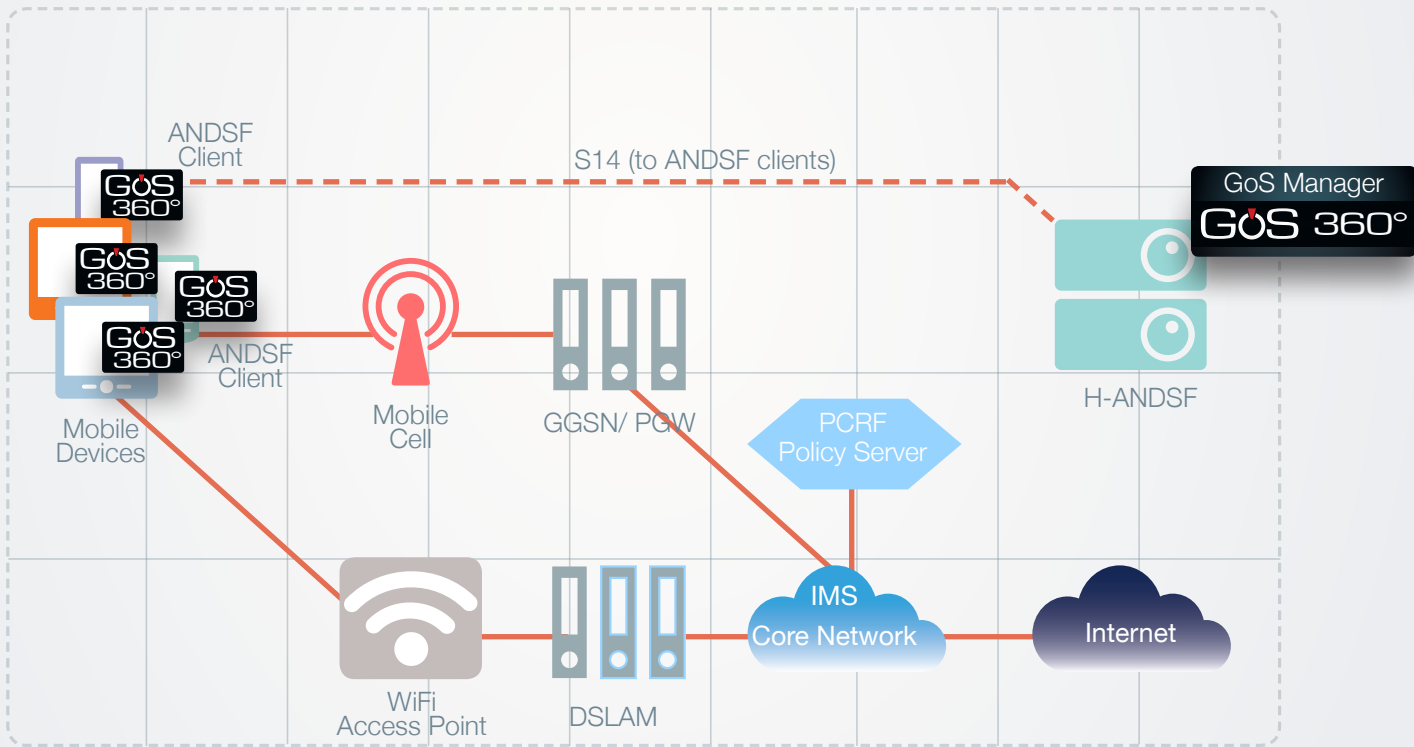
## Benefits

- Seamlessly manage handover between 3GPP and non-3GPP access networks
- Offer dynamic network selection for different applications and traffic types
- Increase user satisfaction through offers, engagement and opt-in / opt-out policies
- Take a leadership position in offering user choice and enhanced experience
- Manage registration and authentication processes seamlessly on behalf of users
- The GoS Agent combining distributed ANDSF functionality provides a platform for a range of new use cases and policy rules

## Examples

- Alleviate local congestion
- Optimise conditions for demanding applications
- Best-available connectivity services
- Manage roaming data access for users
- Offer flexible packages for enhanced data rates and increased data coverage
- Automatic registration with APs and other non-3GPP access networks

# WiFi Offload and Distributed ANDSF



GoS 360° in WiFi Offload and Distributed ANDSF.

# Network Service Assurance

## Challenge

Delivering consistent and reliable network service assurance relies on obtaining accurate information from the network, particularly from the perspective of the user. Yet most network operators have only an incomplete picture of what actually happens at the level of user equipment and devices. With smart connected device penetration continuing to grow and users adopting an increasingly diverse range of applications, it's important for network operators to include an accurate view of user experience in their service assurance solutions.

However, current network monitoring solutions cannot routinely access client devices or monitor the performance of individual applications in the subscriber domain. They cannot look beyond the CPE or network demarcation point to "see" the problem that the customer experiences, either in real-time or historically. Without this data, network operators cannot provide service assurance guarantees or adequately investigate problems that originate beyond their network boundary.

This can significantly impact network service assurance targets, increase the time taken to resolve individual subscriber issues, and lead to unnecessary costs.

## Solution

By installing GoS 360° on client devices, such as mobile handsets, broadband dongles and CPE gateways, network operations teams can view data on application performance and bandwidth problems from smart connected devices.

The GoS 360° client can be easily downloaded to smart devices, enabling it to rapidly populate a network. This means that network operators can rapidly deploy end-to-end service assurance solutions and benefit from the anonymous data collected to provide a better experience from all users.

Each instance of the GoS 360° interacts with a centrally deployed GoS Manager, accessible to network operations teams, presenting them with the information required to manage customer experience, solve issues quickly and efficiently, saving time and money and increasing customer satisfaction benchmarks.

## Benefits

The combination of GoS Agents and GoS Manager provides network operations teams with:

- Access to real-time and historic visibility of traffic
- The ability to remotely identify and resolve root-causes of customer issues in the RAN or LAN
- The means to measure actual link and per application performance and throughput, not

# Network Service Assurance

## Benefits (continued)

network estimates across multiple access technologies (e.g. WiFi, 2G, 3G and LTE)

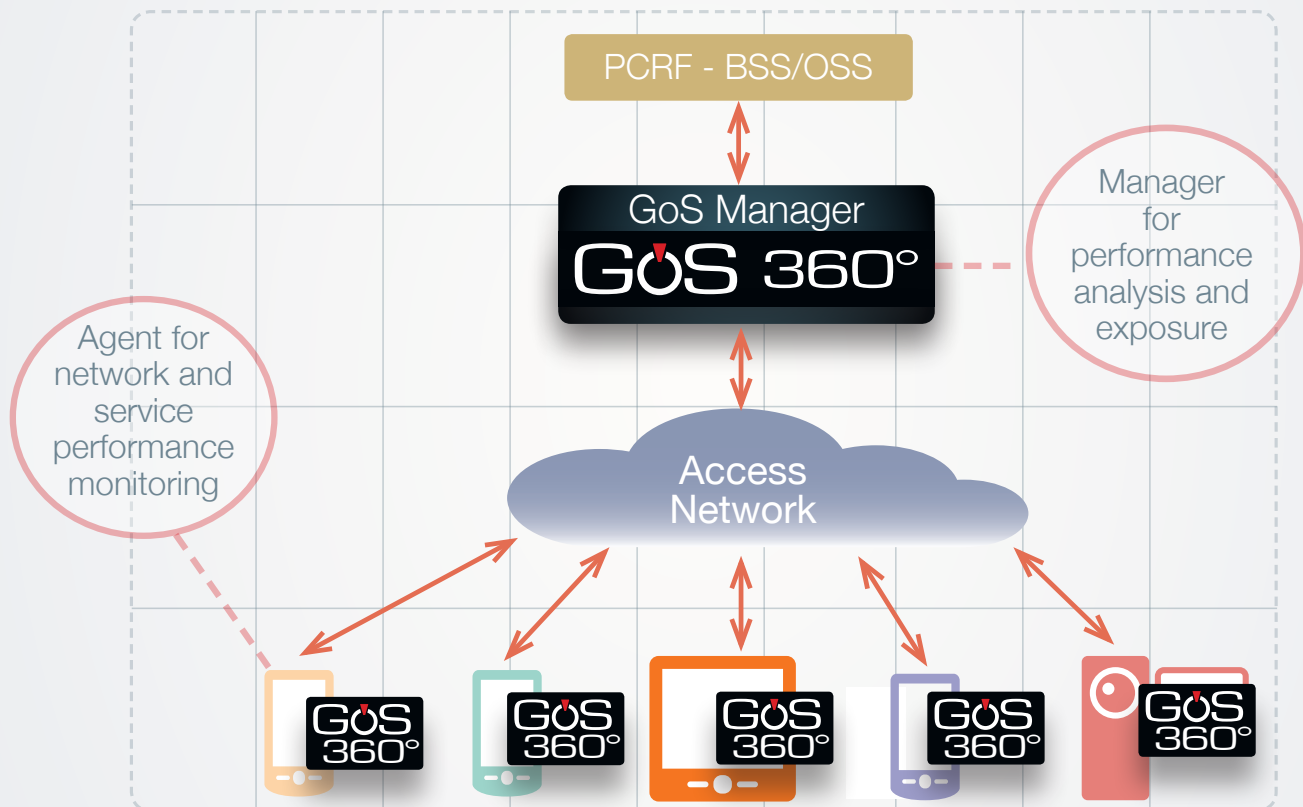
- Correlated and aggregate views of network coverage.
- The ability to shorten customer support call duration and reduce costs
- Improved customer satisfaction, reducing churn
- Reduced costs through efficient network optimisation and management

GoS 360° is the only way to obtain the complete visibility of smart connected devices required for 360° customer service assurance.

## Examples

- Mobile broadband performance
- Mobile user quality of experience management
- Application specific management and support
- Business services
- Fixed line broadband services such as IPTV
- Measurement of streaming video user experience
- Gaming

# Network Service Assurance



GoS 360 Distributed Traffic Detection and Policy Enforcement



# Parental Control and Security

## Challenge

While open access to the Internet is taken as axiomatic for most, there is still a need to protect minors from exposure to inappropriate web content. There is also a parallel need to moderate their access to social media and messaging services during school hours or late at night.

Many service providers offer a range of network services that enable parental control and managed access to messaging and social media services. These filter traffic from connected devices by means of network DPI solutions. Policy enforcement points use information about detected traffic to classify it, determine the appropriate permission according to policy rules and apply the relevant parental controls.

However, while such approaches work well when users are connected to fixed or mobile networks, when devices move to public WiFi hotspots, the controls may no longer be accessible. The nomadic behaviour of users can mean that parental control mechanisms may be inadvertently sidestepped. Service providers need a consistent and reliable means to enforce legitimate parental control policies and to safeguard and protect the Internet experience of minors.

## Solution

The solution is to extend policy control to the mobile device via client software solutions. The ability to enforce policy through a policy enforcement point (PEP) on a user device delivers complete visibility of user traffic and application demands to service providers. This enables them to enforce parental control policies, even when the user roams onto a WiFi network.

Device-based PEP is the only way in which service providers can consistently and reliably maintain, manage and enforce parental control rules, helping safeguard and protect the internet experience of minors.

The GoS 360° solution consists of a network based manager component for interfacing to policy control functions, and a device based Agent. The GoS Agent provides the PEP functionality, enabling parental policy control directly to the device, while the network-based manager offers a simple and scalable way for managing large numbers of devices in conjunction with the policy control elements in the network.

This architecture enables GoS360° to provide a highly scalable platform based on future-proof investment supporting a wide range of use cases, as opposed to delivering a dedicated application per solution. The parental control enforcement is network independent, with the result that the service provider can deploy controls that will work consistently on the device at an individual level irrespective of which service providers' network is delivering Internet access.

The GoS 360° solution enables service providers to deliver OTT policy control between client devices and a cloud-based server, protecting all users and reliably enforcing parental rules.

# Parental Control and Security

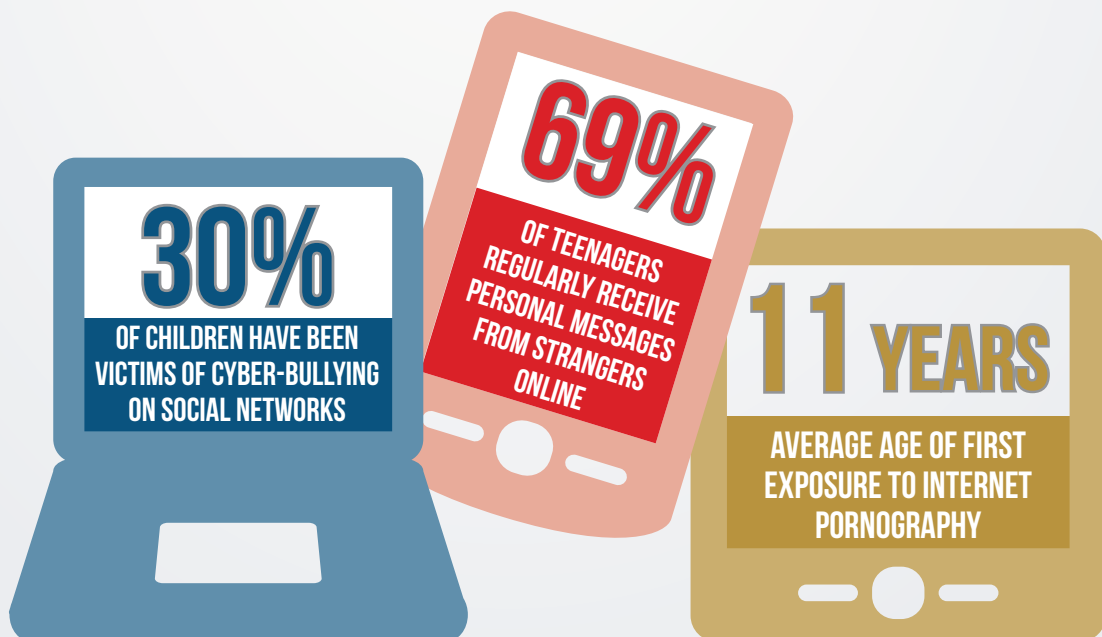
## Benefits

- Complements other battery saving techniques such as fast dormancy to assure the best possible user experience without resulting in race conditions between handset FD timers and background applications that generate additional signalling traffic
- Saves money, not just networks. Through our intelligent algorithms we can suppress and avert signalling storms generated by combinations of poor application and OS design that have led to network outages.
- Provide a framework for additional use cases and benefits

GoS 360° provides the only way in which network operators can intelligently prioritise application traffic at source, before it traverses the network.

## Examples

- Managing signalling load from chatty applications
- Managing RAN overhead and congestion
- Optimising foreground applications
- Ensuring the best user experience



## Over-The-Top Policy Management for MVNO's

### Challenge

MVNOs benefit from their close relationship with the host MNO provider through being able to launch services without the associated cost of network infrastructure investments, often for highly targeted user groups. However, with growing intensity of competition, it is becoming increasingly clear that there is a need to differentiate their service and price plans to a greater extent.

MVNOs typically cannot obtain granular visibility and control of the user experience and are unable to act independently of the MNO to achieve the necessary differentiation. As MNOs seek to leverage the established policy framework, MVNOs risk being left behind without the ability to deliver optimised services, tailored to the needs of their customers.

MVNOs are also critically dependent on the information that can be provided by the host MVNO, which can affect their ability to offer the best available network to subscribers, as they may not have access to local information regarding alternative access mechanisms or to dynamically select the optimal carrier network.

Without the ability to deliver incremental value to subscribers, they reduce their competitive options and risk being perceived purely as low price options.

### Solution

The solution is to deploy a combination of the GoS 360° device level PCEF / ANDSF solutions, together with third party policy engines. The policy engine can be hosted by the MVNO, the MNO or the MVNE that enables and manages the MVNOs airtime and service agreements, while GoS 360° is deployed directly on the MVNO's customers' smart devices (smartphones, tablets or laptops).

By deploying the GoS 360° PCEF solution directly on smart connected devices, MVNOs can access the benefits of policy control and deliver enhanced service and capabilities to individual users without mediation by the host MNO / MVNE.

Improved visibility of the real-time user experiences ensures that MVNOs can offer a range of optimised policies to suit the needs of their customers. With the combination of GoS Networks and third party PRCFs, MVNOs can deliver OTT policy control and optimise user Quality of Experience in real-time and for different application demands.

There can also be significant benefits for device battery life. By managing excess signalling attempts, battery drain can be avoided and life extended. The impact can be considerable. In tests, GoS 360° has been shown to increase battery life by up to 50%

## Over-The-Top Policy Management for MVNO's

This architecture enables MVNOs to support a highly scalable platform based on future-proof investment supporting a wide range of use cases and to achieve market differentiation and respond to competitive challenges.

### Benefits

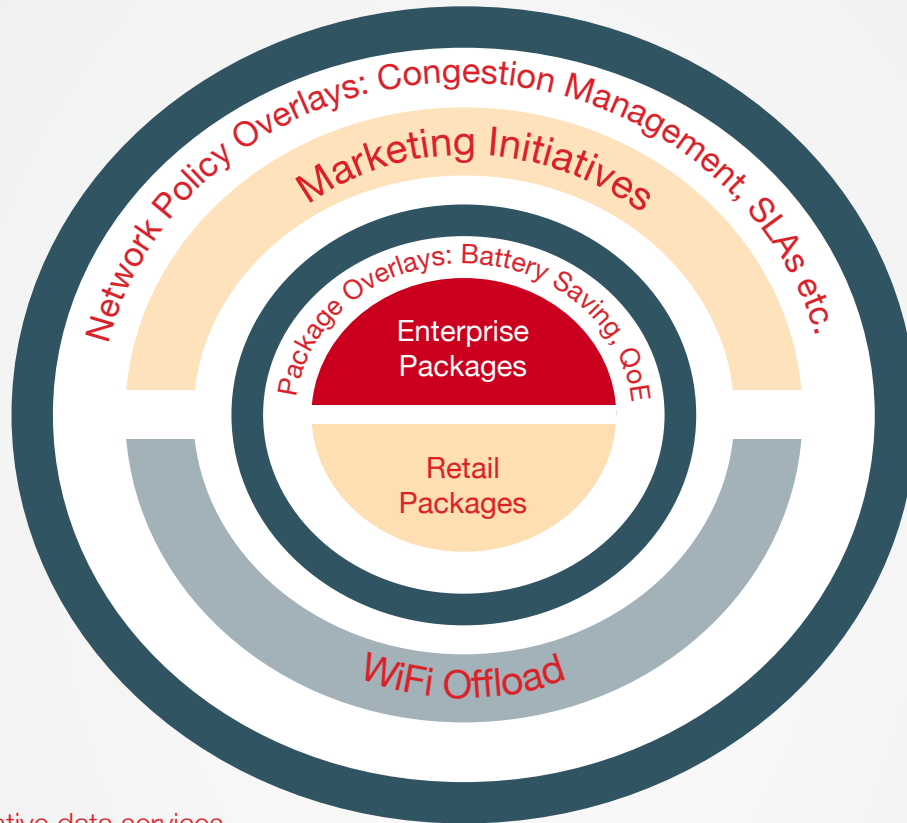
Combining GoS 360° and PCRF servers provides MVNOs with:

- Control of access network choice (e.g. WiFi or 3G/LTE) and service differentiation
- The means to implement Fair Usage Policies (FUP) and differentiated packages based on quota, speed, time, location, application, device etc.
- A complete parental control solution for secure access for minors
- Real-time bill-shock prevention capabilities
- Network congestion avoidance and control
- A platform to launch new services based on enhanced user experience independently of the host MNO / MVNE
- SLA monitoring for user experience and aggregated performance
- Extended battery life for smart devices, increasing user satisfaction

### Examples

- Mobile broadband performance
- Mobile user quality of experience management
- Application specific management and support
- Business services
- Measurement of streaming video user experience
- FUP and packages based on quota, speed, time, location, application and device
- Parental control
- Bill shock
- Network congestion avoidance
- Gaming

# Over-The-Top Policy Management for MVNO's



Rollout innovative data services

## REAL TIME Policies based on a broad range of parameters



Subscriber Plan  
Management



Bill Shock  
Quota Purchase



Network



Devices



Application/ URL  
Parental Control



# Battery Saving

## Challenge

Always-on applications have a big impact on smartphone battery life, which has two important consequences. First, user satisfaction declines, leading to frustration. Secondly, application consumption can be constrained by the impact on battery life – which is not in the interests of users, MNOs, handset OEMs or application providers.

While there are a number of established battery saving techniques for handsets, such as Fast Dormancy, these can interact badly with applications from OTT vendors. Race conditions can occur between automatic shut down of the radio and new requests from applications to connect to the Internet.

Another approach is to use synchronisation manager capabilities that may be available in handsets or in cloud service portals to co-ordinate some of the active synchronisation that takes place. However, this can only be achieved for applications connected to such services. For other applications, there is no optimisation.

Finally, it's possible to block all traffic when handsets are in standby mode, but this also negatively impacts user experience, as instead of pushing data seamlessly from servers, users have to actively request or pull necessary updates.

What's needed is a different approach, one that works intelligently with user applications and takes into account handset state as well as the needs of foreground applications.

## Solution

The solution is to deploy GoS Networks' innovative battery optimiser solution. The battery optimiser enables intelligent and equal access for all applications on the device. It complements Fast Dormancy by intelligently scheduling repeated attempts to access the network. Similarly, it works in tandem with existing synchronisation control applications by co-ordinating access to resources with other applications.

By doing so, excess signalling attempts are managed gracefully, reducing the impact on battery life. The impact can be considerable. In tests, the GoS Networks' battery optimiser solution has been shown to increase battery life by up to 50%.

MNOs and handset OEMs can both benefit from the generation of statistics to help identify badly performing applications, which they can then blacklist. Additionally, OEMs own applications can be white listed to ensure the best user experience.

The GoS Networks' battery optimiser solution is completely complementary to existing capabilities and approaches, intelligently co-ordinating access from other applications and ensuring the best user experience.

Once deployed, the battery optimiser application can be seamlessly upgraded to support other applications, such as WiFi Offload and Quality of Experience control for other handset applications, such as video content delivery and upload, music stream, and many others.



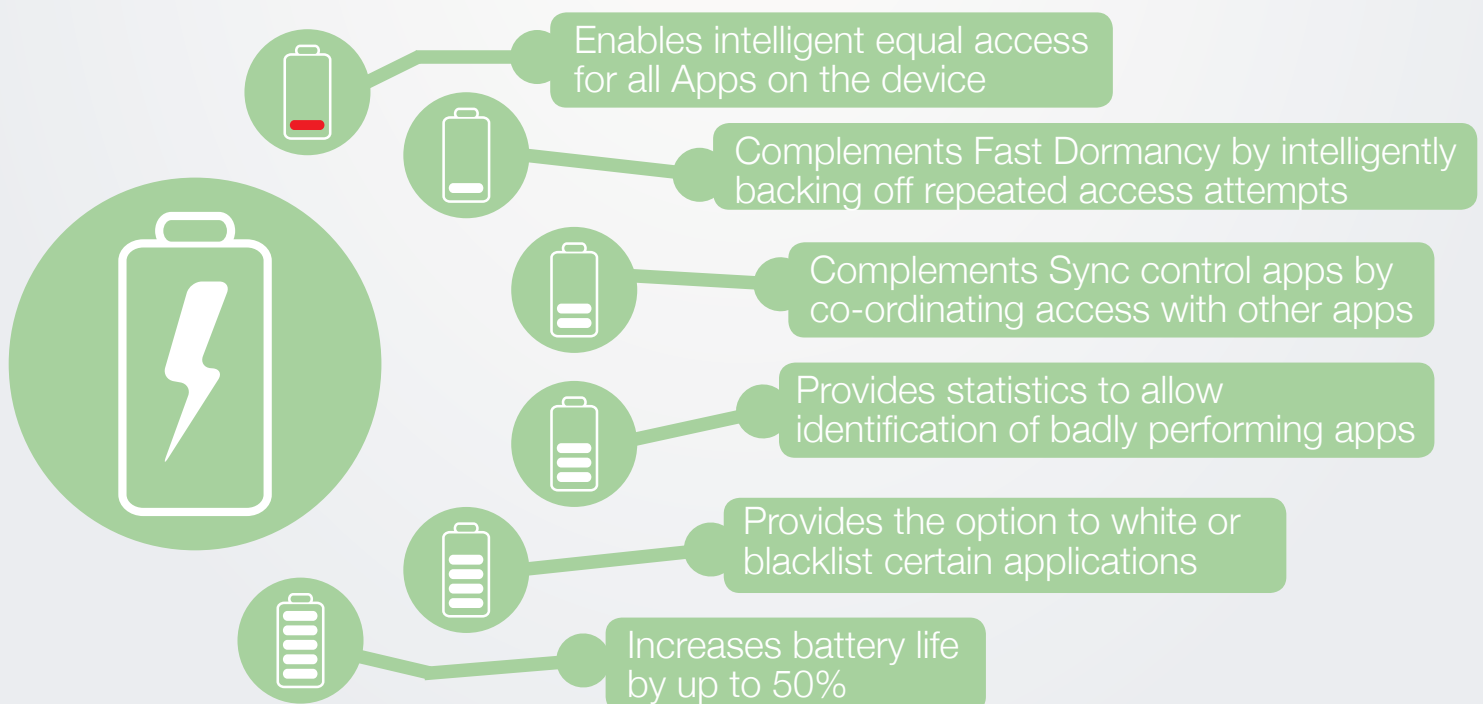
# Battery Saving

## Benefits

- Enable intelligent, equal access for all applications on devices
- Significantly extend battery life
- Enhance user satisfaction
- Complement existing solutions
- Increase application and data consumption
- Generate statistics to enhance application performance

## Examples

- Extend battery life expectancy
- Increase user application engagement
- Deploy new battery saving applications to optimise handset performance and user experience



# Real-time Multimedia

## Challenge

Delivering real-time multimedia is complex and demanding. Users expect flexibility and speed as they access a range of services, switching dynamically from audio to video and back again, inviting other parties to join a session, sharing downloads and streaming their own content to other users. These sessions present significant performance and service optimisation challenges for network operators.

Network operators have to manage real-time multimedia efficiently to ensure consistent quality of experience for their customers. They need the ability to prioritise revenue-generating or preferred services against competing services from OTT providers and other vendors.

## Solution

The solution is to deploy GoS Agent on client devices and GoS Manager in the network core, optionally connected to the PCRF (see Figure 1). The combination of GoS Agent and GoS Manager gives network operators both visibility and control of all traffic, right down to the end user device. GoS 360° is the only way to ensure the consistent, reliable end-to-end prioritisation and dynamic allocation of resources demanded by real-time multi media.

## Benefits

With the unique combination of GoS Agent and GoS Manager, network operators secure:

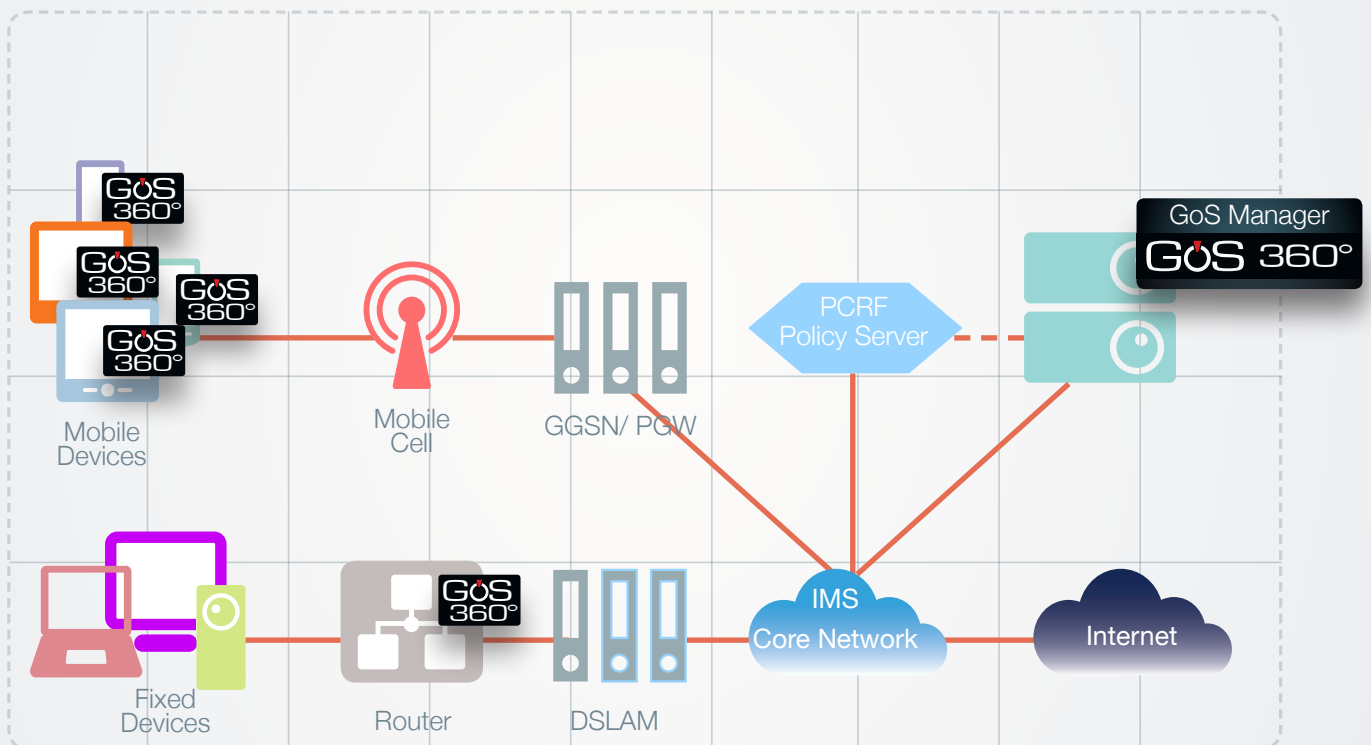
- Real-time visibility of customer experience and demand
- Optimised QoS for multiple, real-time services
- Efficient bandwidth utilisation
- The ability to identify, protect and prioritise preferred user traffic
- Reduced costs through efficient network optimisation and management
- Revenue generation with assured, sticky services

GoS delivers the only means to fully control upstream, user-generated traffic.

## Examples

- Rich Communications Suite (RCS)
- Mobile broadband access via dongles
- Gaming
- Video conferencing
- On-demand IPTV services

# Real-time Multimedia



GoS 360° in Real-time Multimedia Applications

# VoLTE

## Challenge

In the all-IP LTE network for 4th generation mobile, voice sessions compete for bandwidth with other services. Unlike in earlier generations of mobile networks, voice calls are not isolated on specific circuits. This presents a challenge for mobile network operators (MNOs), as voice calls still present a significant source of revenue and there are often clear regulatory guidelines mandating on-going support for voice services. Currently, Circuit Switched Fallback (CSFB) has been proposed for VoLTE sessions. However, this presents further challenges as, in reverting to a 3G or 2G network connection, the data path also falls back to a narrower bandwidth connection, leading to service degradation for the user and risking an increase in customer dissatisfaction.

The latest releases of the 3GPP standards include QoS facilities for VoIP and other services; however this is of no help to operators deploying LTE today based on earlier releases.

MNOs need to ensure constant service availability and consistent quality for voice sessions. They need to offer service assurance to connected devices and handsets, particularly for premium or enterprise customers. Failure to do so may result in regulatory penalties and increase the likelihood of incurring costs through failure to support SLAs.

## Solution

MNOs can deploy GoS Agent in handset devices and GoS Manager in the network. The combination allows real-time services, including voice, to be prioritised (see Figure 4). This means that voice services can be guaranteed in the face of competition from other services. MNOs can protect both core revenues and ensure performance of a fundamental part of their service offer. By deploying GoS Agent and GoS Manager, MNOs can avoid having to adopt CSFB. Alternatively, if CSFB is deployed, GoS can also be used to manage critical data services on the reduced bandwidth connection available once CSFB is activated.

## Benefits

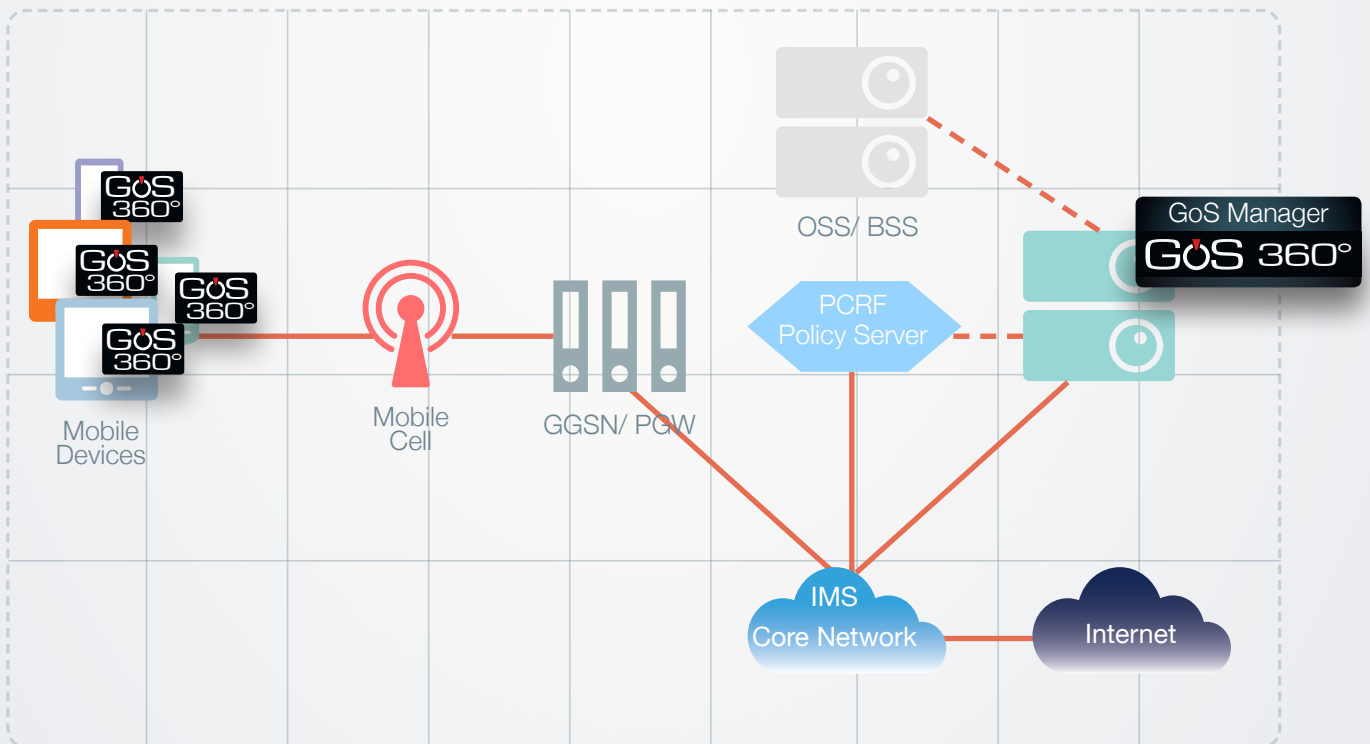
Deploying GoS Agents and GoS Manager enables MNOs to:

- Guarantee real-time voice and video services
- Avoid CSFB and ensure no service degradation for customers
- Protect critical data services where CSFB is selected
- Throttle back other competing services
- Maximise returns from SLAs
- Reduce risk of SLA penalties
- Reduce costs through efficient network optimisation and management
- Generate revenue with assured, sticky services

# VoLTE

## Examples

- Voice and video in LTE
- Voice for IMS-enabled core networks



GoS 360° in VoLTE

# Aggregated M2M

## Challenge

M2M communications can generate significant volumes of data traffic from multiple end-point devices and applications. This traffic is expected to grow dramatically in the coming years. Much of this data is non-critical and not real-time, but, among this, there is also data that does have real-time requirements. What's more, there can be multiple sources of M2M data from within the same location, each with different network requirements and demands. Network operators need to be able to aggregate M2M traffic and prioritise that which is real-time, while ensuring collection of non-real time data.

For example, a vehicle may contain several sources of data – ranging from non-critical telemetry and pay-as-you-go insurance information to critical data such as health-monitors, real-time video being viewed by passengers, telephone calls and so on. As the vehicle travels, it may pass through multiple cell locations or enter WiFi access points while stationary. Similarly, a public transport hotspot solution may need to optimise multiple sources of data while in motion.

This data needs to be prioritised and delivered successfully. Operators may seek to deliver real-time policies for the different applications that are running. The problem is compounded in areas of variable mobile coverage. Real-time M2M data from mobile sources must also be secured and protected against contention with other data streams, particularly when there are constraints on bandwidth or variable transmission quality.

## Solution

The solution is to deploy M2M gateways in vehicles or other locations that aggregate M2M traffic, together with the GoS Agent real-time policy enforcement agent on the gateway. With GoS Agent acting as a PCEF on the M2M gateway, enabling the prioritisation of traffic before it is transmitted to the network, operators can ensure that multiple sources of M2M data are accorded the correct priority and deliver dynamic policy control to meet different conditions and requirements.

The GoS Agent can also monitor cellular and WiFi network availability, enabling the 3GPP ANDSF to select the most appropriate connection.

With GoS Manager installed in the network, each in-service gateway can be managed individually to ensure consistent, reliable transmission of real-time M2M data streams.

## Benefits

Enhancing M2M gateways with GoS Agent and deploying GoS Manager enables network operators to:

- Protect revenue generating services
- Reduce service assurance costs



# Aggregated M2M

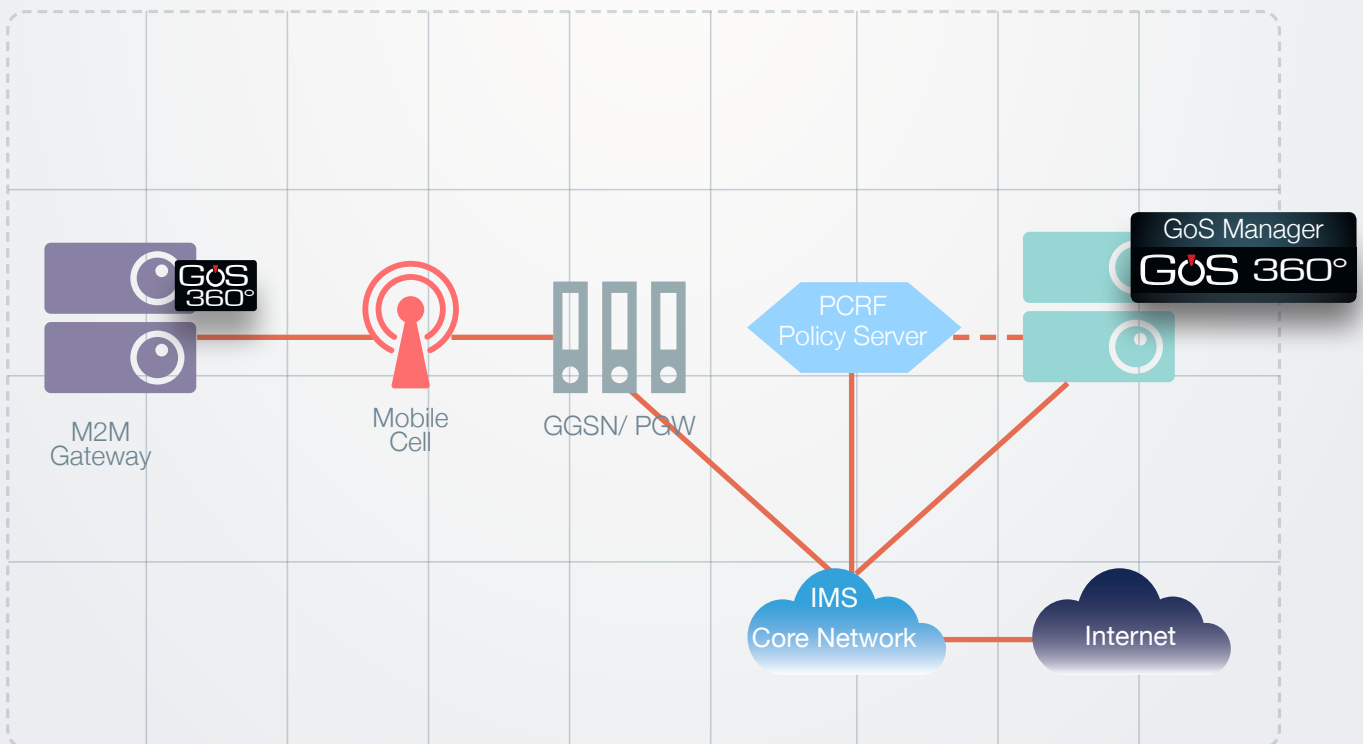
## Benefits (continued)

- Increase service profitability
- Run M2M services across shared links with guaranteed quality
- Reduce costs through efficient network optimisation and management
- Generate revenue with assured, sticky services

GoS 360° provides the only way in which network operators can accurately prioritise real-time M2M traffic at source, before it traverses the network.

## Examples

- In-vehicle services
- Alarms, security and surveillance
- Remote video monitoring



GoS 360° in M2M Gateways

# Glossary

2G	Second Generation Mobile Radio Technology, e.g. GSM
3G	Third Generation Mobile Radio Technology, e.g. UMTS
3GPP	Third Generation Partnership Project
ANDSF	Access Network Discovery and Selection Function
AP	Access Point
CAPEX	Capital Expenditure
CPE	Customer Premise Equipment
CRM	Customer Relationship Management
CSFB	Circuit Switched Fallback
DPI	Deep Packet Inspection
DSLAM	Digital Subscriber Line Access Multiplexer
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications, formerly Groupe Spécial Mobile
IMS	IP Multi Media Subsystem
IP	Internet Protocol
ISMP	Inter System Mobility Policies
ISRP	Inter System Routing Policies
LTE	Long Term Evolution
M2M	Machine to Machine
MNO	Mobile Network Operator
OPEX	Operating Expenditure
OS	Operating System
OTA	Over The Air
OTT	Over The Top
PCEF	Policy and Charging Enforcement Function
PCRF	Policy and Charging Rules Function
PDF	Policy Decision Function
PDP	Policy Decision Point
PEP	Policy Enforcement Point
PGW	Packet Data Network Gateway
QoS	Quality of Service
RAN	Radio Access Network
SGW	Serving Gateway
SLA	Service Level Agreement
TDF	Traffic Detection Function
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
VoIP	Voice over Internet Protocol
VoLTE	Voice over LTE
WiFi AP	WiFi Access Point



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