Memotec WX Series - 4G LTE Enabler

OVERVIEW

Whether in urban or rural settings, across terrestrial or satellite networks, the need for LTE/4G as a cost effective means to meet user demands for increased connectivity and faster speed is clear. As a result, LTE service deployment and penetration is happening at un-precedent speed and will overtake 3G for data services before 2020.

Due to perceived high transmission costs, the use of satellite for backhauling mobile base stations has been essentially limited to higher revenue generating voice services. Meanwhile, delivering mobile high speed data services over satellite has proven to be challenging for most Mobile Network Operators (MNO), as the additional bandwidth cost of delivering such services is typically not offset by the data revenue gains, leading to operating losses. Traditional services, such as 2G/EDGE and later 3G/HSPA, suffer from poor performance across satellite, which prevents end-user to consume bandwidth as they wish, and hence to meet revenue expectations. In particular, while it is true that 3G/HSPA can provide raw high bandwidth (to some extent), the manner in which the user data is encapsulated and transported, and the protocols involved in the RAN (Radio Link Control) results in limited user session capacity to a few 100kb/s and in general poor user experience.

Contrary to 2G and 3G services, LTE is satellite friendly, and, as a network infrastructure, significantly less costly for a service provider to deploy and support. Combined with breakthrough in satellite (“HTS” or High Throughput Satellite) and modern modem technologies enabling to drive down transmission costs per bit a factor 5 to 10, it seems the stars are finally aligned for allowing Mobile Operators to cost effectively deliver broadband services over satellite and make money with it.... conditional on the successful resolution of two important performance factors:

- **End User Experience satisfaction:** Giving end users a true “LTE” broadband experience in line with their expectations is essential to their using the service in quantities to generate meaningful revenue. This means solving the issue of satellite link latency and its negative side effects on wireless services delivery (application stalling, slow downloads, data connection drop-outs, limited user session bandwidth);
- **Effective management of bandwidth:** Being able to manage bandwidth constraint satellite link resources efficiently and intelligently: being application and user aware, prioritizing applications, limiting or preventing excessive bandwidth usage, and more importantly, ensuring user fairness (equal opportunity bandwidth access to all users).

APPLICATIONS

- **REMOTE “HOT SPOT” LOCATIONS:** resorts, mining, oil rigs, islands and remote cities.
- **MOBILITY:** resorts, mining, oil rigs, islands and remote cities.
- **RURAL BROADBAND access services and “white zone” coverage**

BENEFITS

- Deliver users a true LTE service (broadband) experience
- Manage satellite link resources and provide equal access (fairness) to all users
- Optimize traffic and satellite link resources, reducing service delivery costs and enabling Mobile Operators to get additional revenue
To enable MNO to fulfill these criteria, Memotec Inc. partnered with OneAccess to power a new generation of Memotec WX 4G/LTE networking appliances. Through a unique set of features for optimizing 4G/LTE cellular backhaul traffic, MNOs can now realize the full bandwidth capacity potential of LTE. Memotec WX optimizer:

- Eliminates the satellite link latency effect on TCP (the main protocol employed for delivery of most internet traffic) which is the major limitation in throughput over satellite, and provides mobile end-user with a true broadband LTE experience.
- Ensures user fairness by allowing MNO to enforce bandwidth management and QoS rules based on detailed user mobile traffic metrics.
- Ensures that users can access Internet despite “heavy user” applications like torrents, etc.
- Optional bandwidth optimization features allows MNO to deliver 50% and more extra data traffic capacity, and therefore generate additional corresponding revenue, through combined techniques of lossless compression and transparent “byte level” (content agnostic) edge caching.

Combined with Comtech EF Data’s Heights Networking Platform, the Memotec WX provides the most robust and cost-effective means to roll out 4G/LTE advanced services into remote areas, whether with traditional wide satellite beams or new high-capacity High Throughput Satellite (HTS) designs. The Memotec WX can also be teamed with Comtech EF Data’s CDM-760 Advanced High-Speed Trunking modem or CDM-625A Advanced Satellite modem to provide high-speed point-to-point 4G/LTE connectivity.

**OPERATION**

The Memotec WX appliance can be deployed over satellite links at the S1 interface (LTE cell backhaul) as well as in the packet core or EPC (S4, but also IuPS, Gn, and Gi interface). The WX operates at the GTP tunnel layer, directly on the mobile user traffic being carried inside the GTP tunnels. As such, the WX appliance is complementary to the other features available in the modem for optimizing the network layer (L2/L3 protocols): header compression, lossless (GZIP) compression, and network QoS (Diffserv, IP ToS, VLANS).

The appliance can be deployed “in-line” with the modem (Transparent bridge mode):

![ WX SYSTEM](image)

or in “side-car” routed mode of operation, connected to a router using PBR / static routing, and / or VRRP for redundancy purpose (typically at the hub site or in the Packet Core).

![ WX SYSTEM](image)

At hub location, optional clustering mode is available, offering Mobile Operator modular scalability up to 1 Gb/s of throughput, ready for the highest capacity HTS deployment now and in the future.

![ WX SYSTEM](image)
For operation continuity and safe service delivery without interruption, the WX appliance offers several features combination: Physical in-line Ethernet by-pass, 1+1, or 1+n (at the hub) redundancy. In addition, the appliance supports redundant disks, fans and power supplies (depending on model).

It is worth noting that the Hub (Core network side) appliance can be deployed before or after the Packet Gateway (SGW or PGW), allowing virtually any kind of deployment, including cloud based.

In summary, the Memotec WX appliance is easy, safe and transparent to deploy.

- **Transparent to the end user & content provider**
  - Preserve content integrity (lossless compression – no transcoding)
  - Protect content IPR and safety (no object caching)

- **Transparent to the Mobile Operator**
  - Preserve Mobile Operator user traffic & service policies;
  - Maintain metering accuracy (for billing and data plan);
  - Transparent to the mobile network (operate at Layer 2)

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**OPERATION**

The LTE traffic optimization and bandwidth management features offered by the Memotec WX appliance are:

- **GTP Mobile User Data Traffic Optimization**
  - TCP Proxy with TCP acceleration (PEP)
  - TCP stream lossless compression (Deflate)
  - TCP traffic content byte caching (DRE) with “infinite” SSD based cache (from 60GB to 480GB)
  - Point to point or point to multipoint network topology with a shared hub cache (increased caching capacity)

- **Quality of Service**
  - Traffic shaper (per Interfaces, VLAN tag, IPSEC tunnel)
  - Layer 3 Packet tagging (DSCP IP field)
  - Application aware (DPI based) QoS & Filtering
  - User Fairness

- **Visibility**
  - Deep Packet Inspection application level traffic reporting
  - Graphical Monitoring and Troubleshooting
  - Standard Netflow compliant performance data export format

- **Security** *
  - Optional standard IPSEC WAN secured (encrypted) tunneling

Note (*): available next software release
WHY THE NEED FOR TCP ACCELERATION:
When network latency increases, applications may not fully utilize the available bandwidth. Standard TCP implementations include flow controls, which greatly affect application throughput when encountering high latencies and/or packet loss. TCP acceleration with the WX mitigates the effects of network latencies and manages TCP flow control in such a way that WAN bandwidth utilization is maximized faster.

LTE TRAFFIC OPTIMIZATION:
• **Compression**: All TCP flows, including HTTP, are compressed, covering also GZIP-enabled browsers. Within a TCP stream, connection-persistent GZIP-like compression greatly enhances compression efficiency. The built-in compression technology makes sure that packets sent over the WAN are minimized in size to reduce the impact of overheads in application performance (consequently improving the ratio between application data and network bandwidth utilization).

• **Data Redundancy Elimination (DRE)** (Also referred to as transparent byte caching). Users often send and receive repetitive traffic patterns. Common examples are browsing popular news sites, or watching viral videos (video streaming). Leveraging a high capacity SSD-based dictionary and a unique management algorithm able to span 24 hours or more of caching data, the WX DRE technology is transparent and independent from the transmitted content. It is therefore efficient for all types of traffic including text, image and video intensive applications.

VISIBILITY AND QoS TECHNOLOGY OVERVIEW
• **High Performance Deep Packet Inspection**: The WX benefits from OneAccess Visibility technology thanks to a high-speed Deep Packet Inspection (DPI) engine for application recognition as an approach to guaranteeing QoS for different applications. By analyzing traffic based on a range of protocols that run on top of TCP/UDP, the WX distinguishes between different applications, enabling to apply application aware QoS, and reports to the OneAPM server or NetFlow collector to provide traffic Visibility

• **Traffic QoS**: The WXD features advanced QoS functionalities such as Priority, Shaping and User Fairness to prioritize applications based on business requirements.

• **Built-in QoE Troubleshooting Tools**: Troubleshooting user complaints related to poor Quality of Experience (QoE) requires significant time and effort without the adequate tools. The WX records a history of all processed flows with detailed per-flow application performance metrics. The data are split in LAN and WAN metrics with a selection of detailed graphs to enable the user to choose the granularity of information to be observed. Granular views are supported using a drill-down feature, for instance to select specific flows matching certain criteria. The root cause of poor QoE can be thus quickly isolated remotely, be it a server, LAN or network issue, without installing a costly network probe or sending a skilled engineer on site.

• **Open Standard Performance Management Interface**: The WX offers an off-the-shelf solution with OneAPM, an Application Performance Monitoring (APM) server. The WX reporting interface uses open standards, to enable easy integration with existing systems including industry standard Netflow Vg records with documented extensions.
FUNCTIONAL SPECIFICATIONS

Modes of Operation
- Bridge with «Zero Configuration» (transparent to VLANs)
- Routed with static VPN (WAN tunnel)

IP Routing
- IPv4 stack and IP routing
- DHCP on WAN interface for remote installation
- VLAN filtering

LTE Traffic Optimization
Two way TCP Acceleration
- ACK suppression, return path optimization
- Selective Acknowledgment (SACK) mechanism (RFC 2018)
- Large TCP window
- Ramp up & congestion avoidance
- Persistent connection

Redundancy elimination and compression
- IP level compression
- HTTP and unencrypted MAPI Compression (GZIP, header)

TCP performance enhancements
- QoS weighted fair queuing - Diffserv compliant
- Shaping and back-pressure
- Web picture and text compression option
- URL and domain filtering

Application Visibility and Control
Deep packet inspection
- Application recognition at Layer 7
- Application blocking
- Application prioritization

Netflow v9 exporter with extended flows
- Detected application
- Compression statistics
- Flow processing mode
- TCP performance metrics
- Compatible with OneAPM Application Performance Monitoring server)

Detailed troubleshooting graphs in embedded GUI
- Compression, acceleration statistics
- Troubleshooting graphs drawn with flexible flow filtering criteria

VPN Security (*)
- IPsec - ESP tunnel mode
- AES up to 256 bits or 3DES media encryption
- Shaping of bandwidth per tunnel

WAN Link Management (Routed mode only)
- Link monitoring based on ICMP echoes, SNMP monitoring or script
- Load sharing per packet, source, destination or session
- Traffic policies to force link (policy-based routing)
- Turn-on link via web interface (for costly backup links subject to specific authorization)

High Availability
- To ensure operational continuity in case of hardware/software failure
- VRRP in routed mode
- Ethernet-bypass in bridge mode
- Redundant disk, fan and power supply standard or optional

Local & Remote Management
- Secure Web interface (HTTPS)
- Secure Command Line Interface (CLI)
- IMPI: console over IP

Administration features
- Setup wizard with auto configuration
- SNMP/MIB support
- WAN link monitoring
- NTP synchronization
- Extensive diagnostic tools

Note (*): available next software release
PRODUCT & MODELS SPECIFICATIONS

<table>
<thead>
<tr>
<th>WX 360</th>
<th>WX 550S</th>
<th>WX 550M</th>
<th>WX 2450S</th>
<th>WX 2450M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simultaneous Active TCP Sessions</td>
<td>600-1000**</td>
<td>1500-2000**</td>
<td>4000</td>
<td>10000</td>
</tr>
<tr>
<td>Processing Capacity* (TCP acceleration w/o compression)</td>
<td>30 Mb/s</td>
<td>50 Mb/s</td>
<td>100 Mb/s</td>
<td>200 Mb/s</td>
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<tr>
<td>Caching Storage Space</td>
<td>40GB</td>
<td>80GB</td>
<td>80GB</td>
<td>440GB</td>
</tr>
<tr>
<td>Application with DRE (LTE traffic optimization) enable</td>
<td>LTE cell site with 8 Mb/s or less down nlink</td>
<td>LTE cell site with 20 Mb/s down nlink</td>
<td>Large cell site or remote cell aggregation site with 30 Mb/s down nlink or small hub serving a shared outbound link of 30 Mb/s</td>
<td>Hub serving a shared outbound link to remote cell location of 100 Mb/s</td>
</tr>
</tbody>
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Notes: (*) actual processing capacity depends on traffic profile, actual number of simultaneous TCP session being processed, and features enable. Capacity account for aggregated DL + UL traffic (LAN side)

(**) release v7.3 software upgrade

(***) model “S” can be upgraded to model “M” - software upgrade

WX 360 Hardware Specifications
- Desktop, wall mountable
- W x H x D: 275 x 55 x 150 mm; Weight: 1.3 kg
- Operating temperature: 0°C to +45°C
- Humidity: 10 - 90% non condensing
- 60 GB SSD drive for system and DRE dictionary storage

Power Supply
- External adapter 12V - 3A
- Voltage range: 90 - 264 VAC - 50/60 Hz
- Power consumption: <35 W

WX 550M Hardware Specifications
- 1U - 19” rack mounting
- Dimensions: 43 mm (H) x 437 mm (W) x 287 mm(L) (1.7” x 16.8” x 11.3”)
- Weight: 5 kg (11 lb)
- Power supply: internal 100-240 VAC 200 W max
- Operating Temperature: +10°C to +35°C
- MTBF at 25°C: 51,400 H

Application with DRE (LTE traffic optimization) enable
- LTE cell site with 8 Mb/s or less down nlink
- LTE cell site with 20 Mb/s down nlink
- Large cell site or remote cell aggregation site with 30 Mb/s down nlink or small hub serving a shared outbound link of 30 Mb/s
- Hub serving a shared outbound link to remote cell location of 100 Mb/s
- Hub serving a shared outbound link to remote cell location of 150 Mb/s

Notes: (*) actual processing capacity depends on traffic profile, actual number of simultaneous TCP session being processed, and features enable. Capacity account for aggregated DL + UL traffic (LAN side)

(**) release v7.3 software upgrade

(***) model “S” can be upgraded to model “M” - software upgrade

WX 2450M Hardware Specifications
- 1U - 19” rack mounting (require 30” depth/2 posts rack)
- Dimensions: 43 mm (H) x 426 mm (W) x 692 mm(L) (1.7” x 16.8” x 27.2”)
- Weight: 17.9 kg (39.46 lb)
- Power supply: redundant, hot-swap 100-240 VAC 700 W max
- Operating Temperature: +10°C to +35°C
- MTBF at 25°C: 80,000 H
- RoHS and CE conformity
- 2 x Gigabit Ethernet bypass ports (bridge mode)
- 2 x additional Gigabit Ethernet ports (routed mode)
- SSD drive of 120 GB; 80 GB allocated to data deduplication storage

Contact Us

Memotec WX Series - 4G LTE Enabler | PRODUCT DATASHEET

memotec.com