

Memotec EDGEPlus™

Solution for global GSM services

Expand your data service offering beyond
boundaries without increasing your costs

Sustain Growth

Increase Revenue Stream

Streamline Operating Costs

Guaranty Service Integrity



EDGEPlus™

Your Gateway to GSM Broadband Data Services

EDGEPlus™

Memotec, the pioneering supplier of GSM network optimization and satellite backhaul solutions, introduces the Memotec **EDGEPlus** Series CX Gateway.

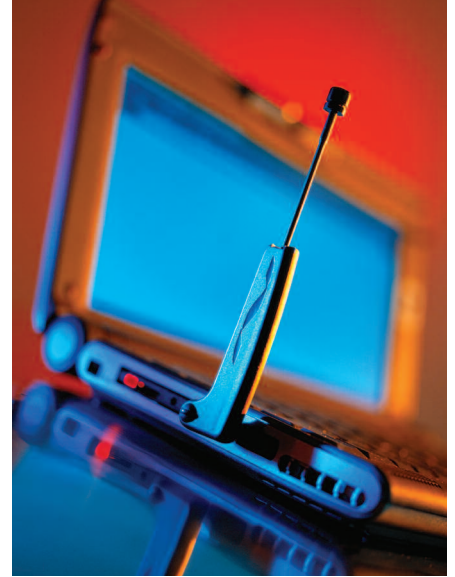
Based on the voice optimization strengths of the current Memotec CX Gateway, the Memotec **EDGEPlus** Series can transport and optimize the bandwidth for GSM 2.5G data services (GPRS and EDGE) at the Abis interface (BTS to BSC link). In fact, the unique technology inside the **EDGEPlus** Series delivers traffic optimization and **bandwidth reduction of GSM 2.5G Abis traffic up to 4:1.**

Key Features

- Up to 4:1 bandwidth reduction [GSM 2G/2.5G Abis links]
- Abis EDGE channels compression
- Satellite compatible (SCPC or TDMA)
- Support FR, EFR, HR and AMR codecs
- Powerful real-time traffic monitoring tool
- GSM vendor independent

Key Benefits:

- Proven solution
- Enable global GSM broadband data service coverage
- Dramatically lower EDGE service introduction
- Cut BTS backhaul operating costs in half



Featuring ultra-low latency of less than 10ms, the **EDGEPlus** Series carries GPRS and EDGE traffic over terrestrial and satellite transmission networks, irrespective of the technology being used (SCPC or TDMA). And like the current Memotec CX Gateway solution, the **EDGEPlus** Series is network protocol agnostic, performs flawlessly across TDM, IP, or ATM network infrastructure and supports a wide range of communication interfaces (E3, E1/T1, Serial, Ethernet).

The Memotec **EDGEPlus** solution leverages the expertise Memotec has earned in GSM 2G Abis and Ater links backhaul optimization. With hundreds of GSM sites deployed and operational across both satellite and terrestrial transport networks globally, Memotec has proven its ability to connect to all major GSM equipment vendors of BTS, BSC and MSC network infrastructure.

Challenges

The Challenges

Today's GSM networks are rapidly being data enabled for the delivery of EDGE services. However, in areas where transmission infrastructure is costly (e.g., leased lines or satellite backhaul) there is a high OPEX associated with deploying EDGE services. Enabling EDGE requires adding 4 DS0s (256 kbs) of bandwidth and more to each BTS Abis link, which translates to a minimum additional cost of \$10,000/year/BTS over satellite.

Adding EDGE services could also require an additional E1 interface on the BTS, as more TRXs are often needed to carry the data service. In the case of using regulated leased line services to connect the BTS, obtaining extra E1 lines is both cumbersome (delay) and costly.

This significant minimum OPEX cost for EDGE services is important when you consider that customer demand for EDGE is still emerging and limited to a few select users in many markets outside city centers. Yet previous experience with deployment of voice services in low-income rural areas has demonstrated unexpected pent-up demand. To effectively exploit this opportunity with reduced risk, the GSM operator needs a solution that minimizes the OPEX.



The Opportunity

The Memotec **CX Gateway** and **AbisXtender** satellite backhaul solution are opportunity enablers for GSM operators who have an eye on emerging markets. While the **CX Gateway** has already saved GSM operators millions of dollars in OPEX per year by reducing their transmission costs, the **AbisXtender** solution enables to expand profitable GSM voice services to the outer edge of the network, like low density or geographically challenged areas.

These proven solutions increase revenue, market share, service coverage and overall company profitability.

Now comes **EDGEPlus**, the latest GSM opportunity enabler. With **EDGEPlus**, GSM Operators are now able to deliver broadband data services in those low density and geographically challenged areas with minimal or no increase of OPEX costs.

With **EDGEPlus** GSM operators can meet customer demand for:

- **BROADBAND SERVICES:** GSM EDGE offers a cost effective and viable alternative to broadband access in areas where cable plants (copper, coaxial or fiber) are not available.

- **HANSET BASED VALUE-ADDED SERVICES:** GSM EDGE enables new mobility applications like IMS, web browsing, instant messaging, file transfer, video and audio streaming.

- **GLOBAL SEAMLESS BROADBAND (2.5G/3G) DATA SERVICE COVERAGE:** Businesses and government agencies on the move require the ability to use the same applications on their mobile wherever they are located.

With **EDGEPlus** GSM operators can yield the following benefits:

- **FEWER TRXS:** GSM EDGE uses up to 75% less radio channel capacity (TRXs) and therefore much less CAPEX than GPRS.

- **MORE REVENUE:** Increase revenue and bottom line at a marginal cost.

- **DIFFERENTIATOR:** Provide a complementary alternative to 3G in areas where 3G is not economic to deploy;

- **FUTURE-READY:** Enable a smooth migration to 4G and IMS, as GSM EDGE can support VoIP/Multimedia broadband mobile services and handsets as well.

The Solution

The Memotec **EDGEPlus** emerges from the expertise and technology associated with the highly successful Memotec CX Gateway. Based on the same principle of transparency to the BSS system, the **EDGEPlus** features:

- Transmission layer operation that guarantees GSM vendor interoperability and software release independency (no protocol interference).
- A new ultra-low delay forwarding algorithm with separate processing for signaling, voice and data traffic, allowing the operator to allocate specific QoS parameters to each traffic type.
- A new traffic classifier that automatically detects dynamically the Abis interface mapping, the different GSM voice codecs and the Abis signaling and data channels.
- Non-intrusive voice traffic optimization (zero quality loss) achieved through the removal of non-significant information (stuffing bits, redundant SID frames) and idle channels.
- PCM line clock synchronization compliant with 3GPP BTS requirements.

idle	EFR	SID	GPRS
EFR	EFR	SID	idle
idle	SID	SID	EFR
SID	EFR	GPRS	idle

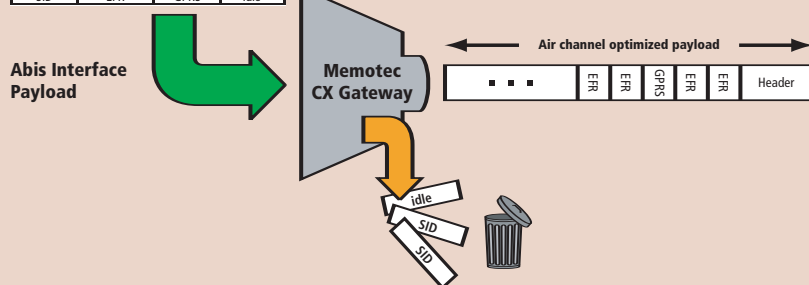


Figure 1: Abis interface traffic optimization method

Together with CXMON, Memotec's new CX device polling application, **EDGEPlus** enables the operator to monitor precisely each Abis interface with real time graphic visualization of the different traffic being forwarded (signaling, voice, data).

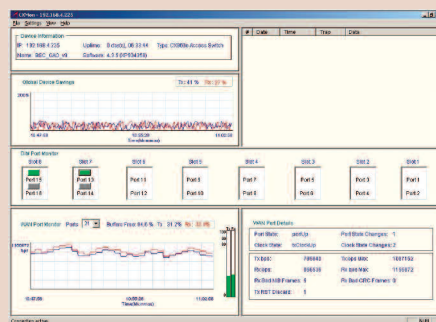


Figure 2: CXMON Abis interface monitoring tool

CXMON displays also real-time information on discarded frames and optimization ratio. As a result, CXMON allows the GSM operator to control the quality of service delivered over the backhaul network and fine tune the network efficiency for optimal cost effective utilization.

The Business Case

The Memotec **EDGEPlus** enables genuine business opportunities that increase revenue at lower cost and risk. Below are three compelling cases based on deploying the Memotec **EDGEPlus**.

Rural Areas Coverage (Fig. 4):

- 30 BTSs network with 3 TRXs each deployed using Memotec AbisXtender satellite backhaul solution
- 500 user per BTS (14mE/subs.)
- Satellite Cost: \$3000/MHz/month
- Adding EDGE Services: 25 users per BTS (5% penetration), assuming 10% of EDGE users active simultaneously at the busy hour.

With Memotec **EDGEPlus** solution, adding EDGE service to AbisXtender will require only 1,636 kHz of additional transponder capacity, i.e. a cost of **\$4,908/month**, while bringing revenue of **\$22,500/month**.

Additional Revenue: \$270,000/year
Cost (OPEX): \$59,000/year
Benefits: \$211,000/year



Assumptions:

- Voice users = 32mE*; Blocking Factor = 1%;
- EDGE Service: penetration = 10%*; user active (peak hour) = 5%*;
- Additional ARPU per data users = \$30/month
- Satellite link spectral efficiency: 1.8 bits/Hz [8PSK coding]

* Except AbisXtender

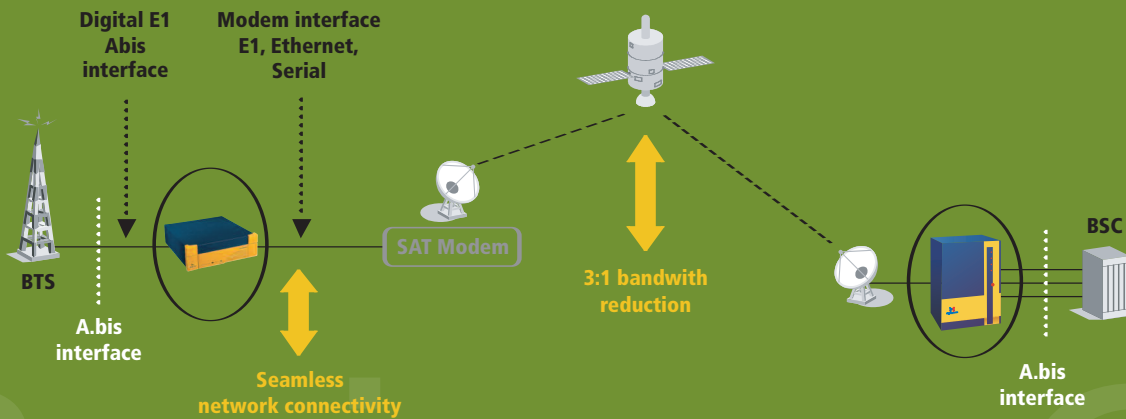


Figure 3: Satellite backhaul (point-to-point)



Satellite backhaul (Fig. 3):

- 1 remote BTS site (6 TRXs, requiring 1152 Kbs bandwidth in drop and insert mode) connected over a SCPC point-to-point satellite link
- Satellite Cost: \$3,000/MHz/month
- Adding EDGE service: 4 x DS0s = 256 Kbs
- Cost = \$3,840/month, plus \$853/month for EDGE Service

With Memotec **EDGEPlus** solution, the bandwidth required is now **512 Kbs, with a cost of \$1,707/month.**

Additional Revenue: \$20,000/year
OPEX Savings: \$25,000/year
Benefits: \$45,000/year

Leased line backhaul (Fig. 5):

- 4 BTS - 3 TRXs each, (total 12 TRXs) groomed to an E1 through an add/drop mux, connected through a long distance leased line to the BSC (Abis links)
- Leased Line cost = \$2,500/month
- Adding EDGE service requires a minimum of 1024 kb/s extra bandwidth capacity and adding a 2nd E1 leased line

With Memotec **EDGEPlus** solution the bandwidth required is now only 1024 kb/s, i.e only one E1 leased line!

SAVINGS: \$30,000/year with additional headroom to double the BTSs capacity! And no need to add extra leased line capacity with introducing EDGE.

Additional Revenue = \$34,000/year
Cost (OPEX) = \$0

6 TRXs per BTS case study:

Adding EDGE service would require 3 E1s. With Memotec **EDGEPlus** solution only one E1 is needed, i.e a **bandwidth reduction of 3:1 worth \$60,000 savings per year and additional revenue of \$80,000.**

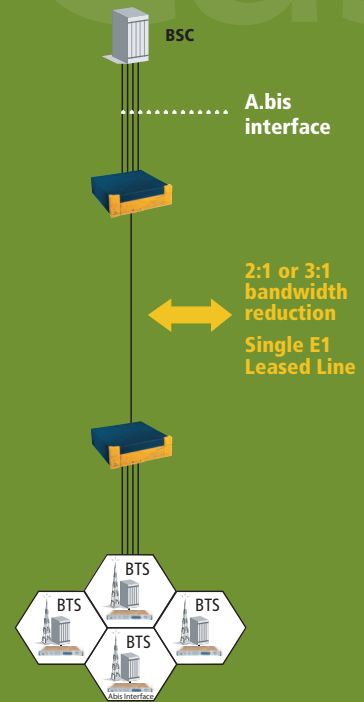


Figure 5: Leased line backhaul

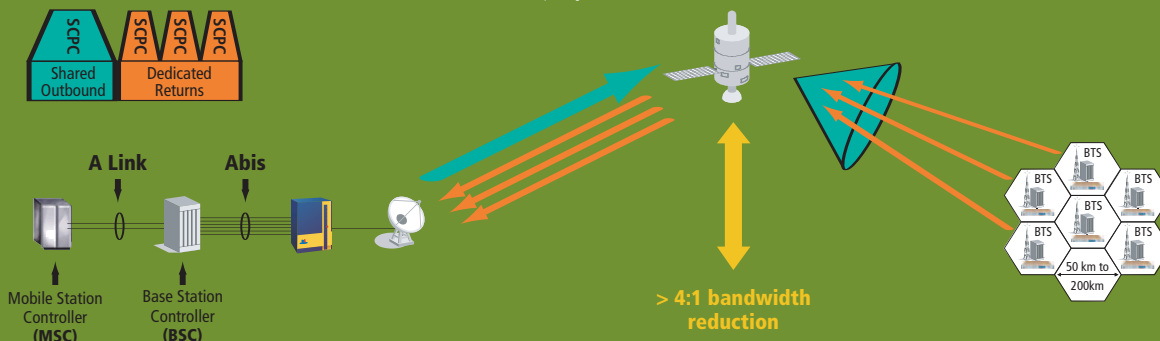


Figure 4: Satellite AbisXtender (Rural Areas Coverage)

Technical Specifications

Model	Abis/Ater interface (T1/E1)	TRXs	I/O module slots
CX900s	1 to 4	3 to 24	6
CX960e	1 to 16	3 to 48	8
CX2000	4 to 64	12 to 192	32

GSM Codecs supported	FR, EFR, HR, AMR (both FR and HR)
Data Services	2G (GPRS), 2.5G (EDGE)
WAN uplink	E3 G.703* T1/E1 framed/unframed Serial (up to 5 Mb/s) 10/100 Mb/s Ethernet
WAN protocol	TDM, IP, Frame-Relay, ATM
Optimization ratio	Up to 3:1 (2G); Up to 4:1 (2.5G)
Abis/Ater interface Clock Synchronization	Loopback; Through clocking with regeneration; Optional Stratum 1-GPS clock synchronization
Abis/Ater Interface	T1: - Line type: ANSI T1.403 (PRI), AT&T TR 62411(D4), and TR 54016 (ESF) - Encoding: JBZS (AT&T), AMI, B8ZS, ZBTISI, NRZ, NRZI E1: - Line type: CEPT (PRI), G.703/G.704 with or without CRC4 & MF - Encoding: HDB3, AMI, NRZ, NRZI, 75 or 120 Ohms AIS, RAI and NFAS bits relay
SS7 channel processing (Ater)	SS7 channels drop & insert multiplexing Transparent transport over IP, HDLC frame or TDM with optional FISU and PCR mode MSU spoofing
GPRS/EDGE BSC and SGSN interface (Ater)	Interface: T1/E1, Serial, Ethernet Protocol: Frame-Relay, IP, ATM (AAL5)
Abis/Ater Interoperability	3GPP compliant; IOT with all major GSM vendors
Optional additional interface	TDM channelized T1/E1 with Drop&Insert Serial Synchronous 10/100 Mb/s Ethernet Analog voice (order wire) T1/E1 digital voice trunks with compression (G.729ab)

Power Supply	85-264 VAC at 50-60 Hz, or DC-48V with optional 1+1 redundancy
Size	3U, 19" rack mount chassis (except CX2000: 12U)
Redundancy (optional)	1+1 or N+1
Environmental	ROHS Compliant Operating Temperature: 0 to 45°Celsius Storage Temperature: -40 to +80°Celsius Operating Humidity: 0 to 95%, non-condensing
Telecom Certifications	USA FCC Part 68, IC, Canada CS03, CTR 2, 3, 4, 12, 13 and 21, TS 002, 003, 016, 031 and 038
EMC Certifications	FCC Part 15 Class A, EN55022 Class A, AS3548 Class A, EN55082-1
Safety Certifications	IEC950, UL1950, CSA, EN60950, TS001, UL, TUV, TUV GS

* available on CX960e and CX2000 only; ATM protocol.

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EDGEPlus: the solution for expanding GSM services

As a GSM operator, you face rising OPEX costs when you expand the backhaul of your BTS access network. Now Memotec **EDGEPlus** brings you the solution to reduce your expansion cost as you smoothly migrate your network to GSM 3G/4G and expand your service offering to the outer edge of your network. With **EDGEPlus** you can increase your revenue by offering your customers EDGE broadband data services—without increasing your OPEX. Whether you are using leased line, point-to-point, or shared satellite transmission services, **EDGEPlus** is the best solution. Please contact the Memotec dedicated support team (COE@memotec.com) or call our local representative (www.memotec.com). We will help you find the most cost efficient design for your network.

About Memotec

Memotec is the pioneering supplier of cellular network satellite backhaul and GSM network optimization solutions. Memotec's flagship product, the CX Gateway, enables GSM operators to reduce dramatically network operating expenses by cutting transmission costs, both at the access (BTS/Abis interface) and network core (MSC-BSC A/E interfaces).

Leveraging the satellite modem expertise of parent company, Comtech EF Data, Memotec's CX Gateway offers GSM operators a new solution paradigm for deploying profitable voice & data services in rural, low density or geographically challenged areas.

With hundreds of cellular sites deployed and operational across both satellite and terrestrial transport networks in Latin America, the Middle East, Africa and Asia, Memotec's solutions are proven globally.

Memotec is headquartered in Montreal, Canada, with offices around the world, and is a wholly owned subsidiary of Comtech EF Data Corp., and its parent company Comtech Telecommunications Corp (NASDAQ: CMTL).

