Advantech Wireless

Total Communication Solutions

Leading provider of customer-focused technology and communications solutions for the global marketplace

Advantech Wireless

Who we are

- ADVANTECH is a global manufacturer of satellite and terrestrial point-to-point and point-to-multipoint wireless communications solutions.

- *“With our portfolio of strategically aligned businesses we have an unmatched ability to respond to market requirements and take advantage of fast-changing technologies to cater to our client needs, delighting them with first to market superior solutions.”*
  David Gelerman

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Wireless

Advantech's Triple Play

GSM Backhaul Solutions

(DVB-RCS, SCPC, and Microwave solutions)

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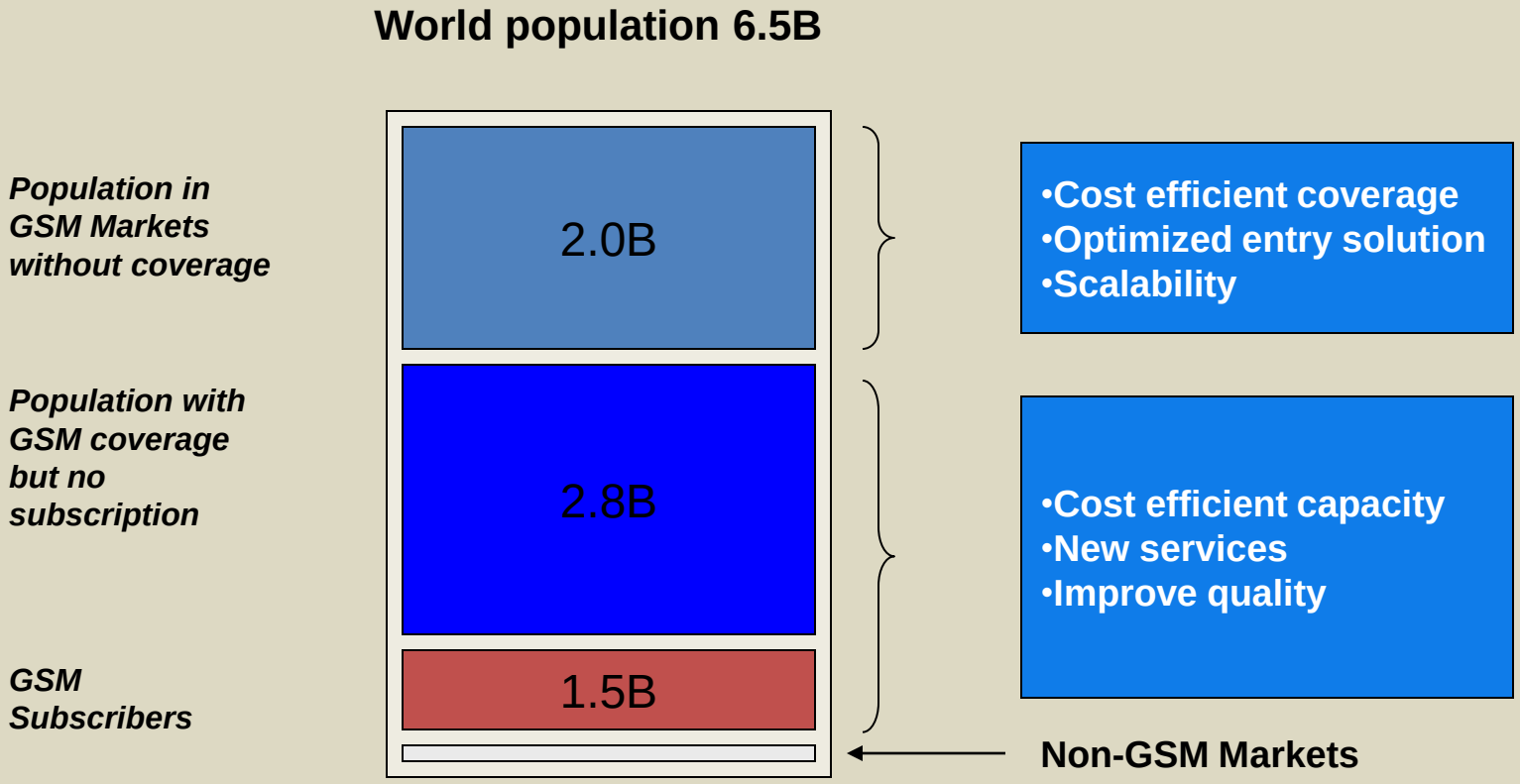
The GSM Market

New users will be within and outside today's coverage.



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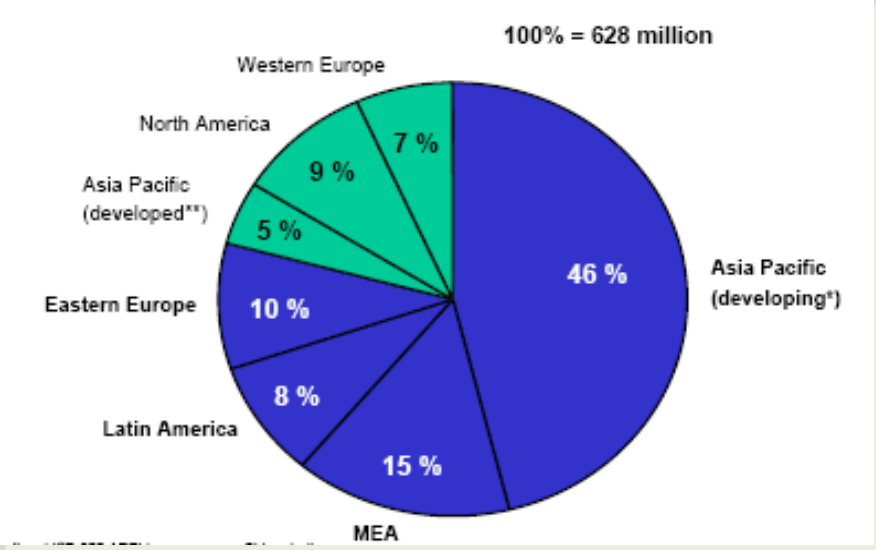
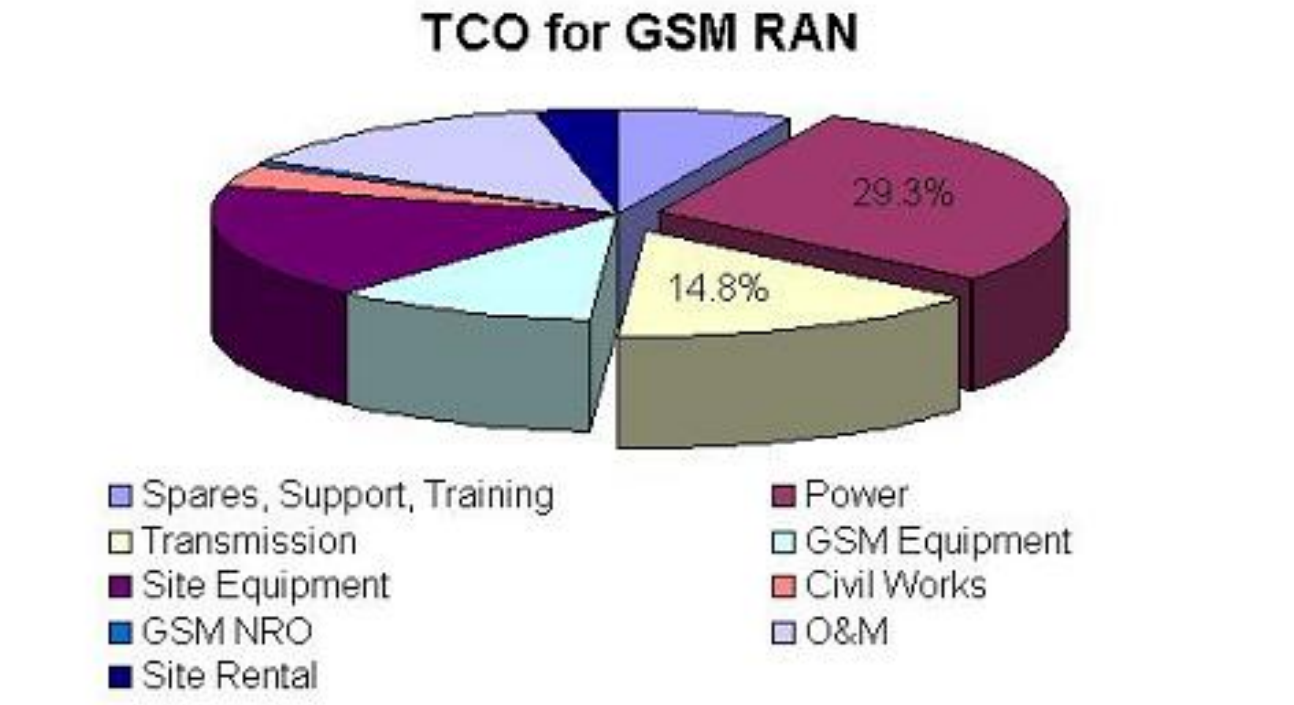
The GSM Market

Hundreds of Millions **new** subscribers over the next 4 years...



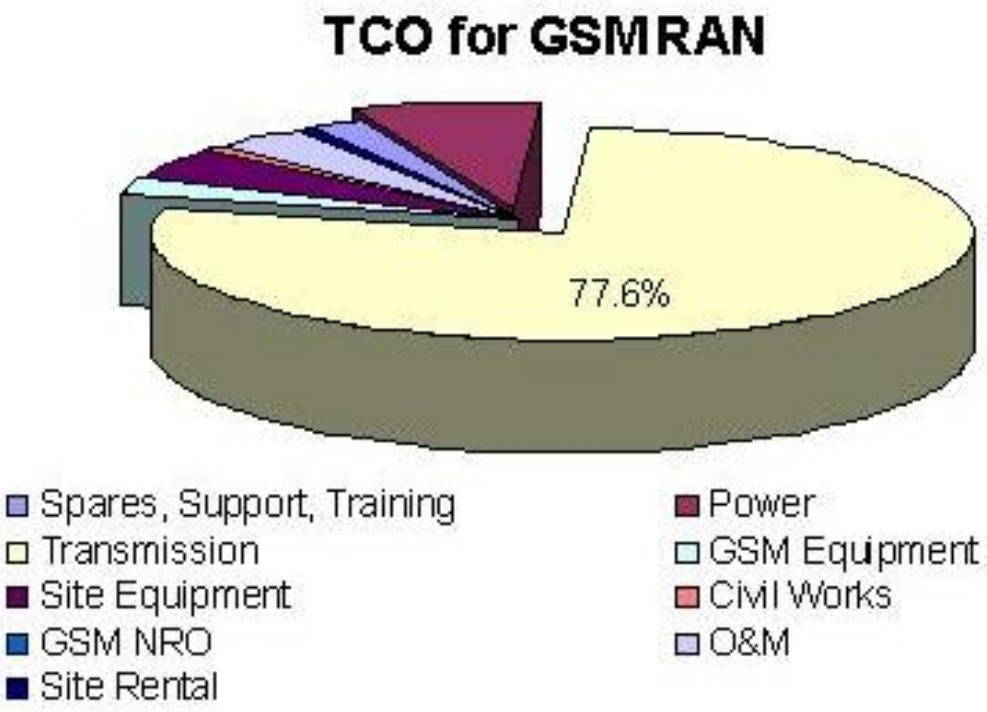
TCO for GSM RAN (Terrestrial)



Based on leased line transmission rates of $700/month per E1.

Note: Data based on Middle East and Africa markets.

TCO for GSM RAN (VSAT)



Based on VSAT transmission rates of $3000 Mbps/month.

Note: Data based on Middle East and Africa markets.

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Issues Facing Cellular Service Providers

• Lack of infrastructure and cost to deploy access transmission networks over vast and/or geographically challenged areas….in some cases, 40% of GSM carrier OPEX is related to backhauling traffic…

• With Urban networks built out, the focus has to go toward outlying towns and rural areas. Lower subscriber density can further increase carrier OPEX concerns.

How to efficiently reach the next billion subscribers?

Solution 1: Small sites: Deploy highly efficient DVB-S2/RCS system with optimized Abis or Abis over IP solutions to drastically reducing OPEX associated to GSM backhaul.

Solution 2: Large sites or aggregation points: Deploy high modulation SCPC modems providing highest and most efficient bit/hz transport.

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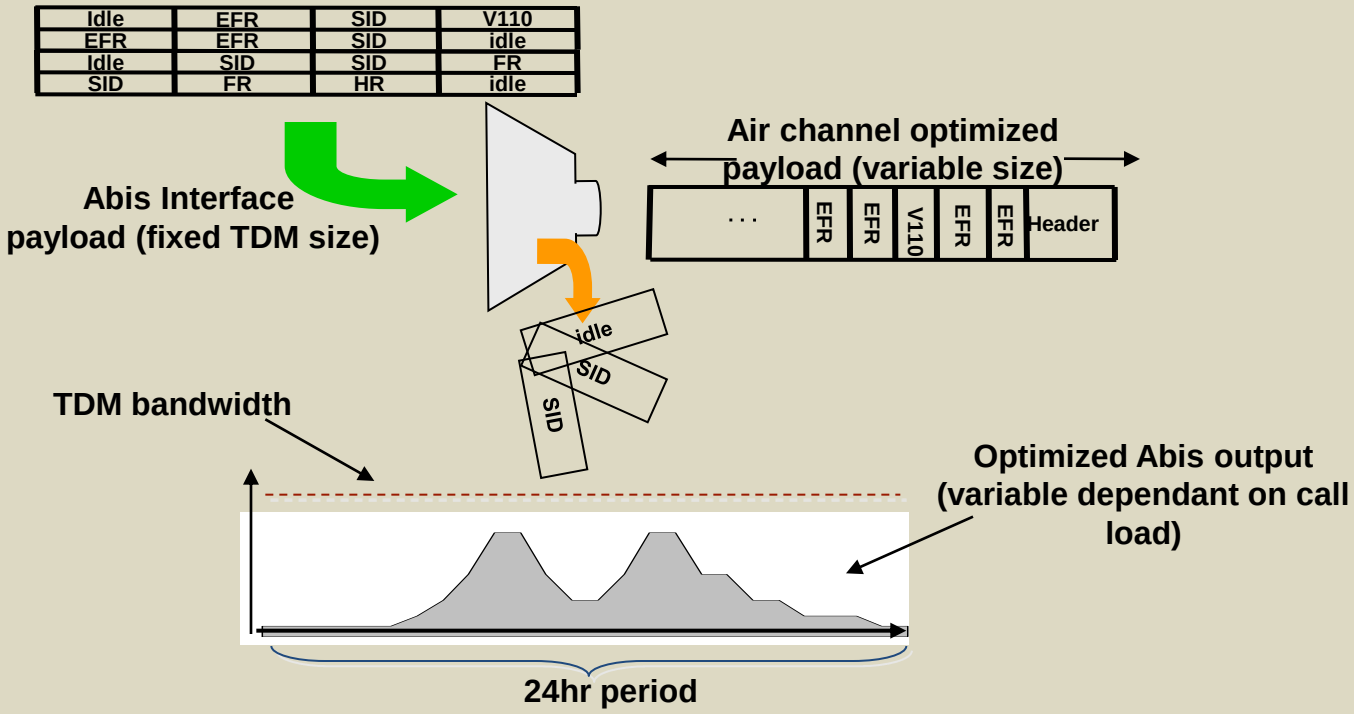
What is Abis optimization or Abis over IP?

Abis interface is a GSM equipment vendor semi-proprietary interface, however, numerous Abis optimization vendors have identified common elements to these interfaces (silence, idles, etc) which allows for that traffic to be optimized and transported over cost effective IP networks. Abis over IP has also been implemented internally to some GSM equipment vendor BTS/BSC solutions.



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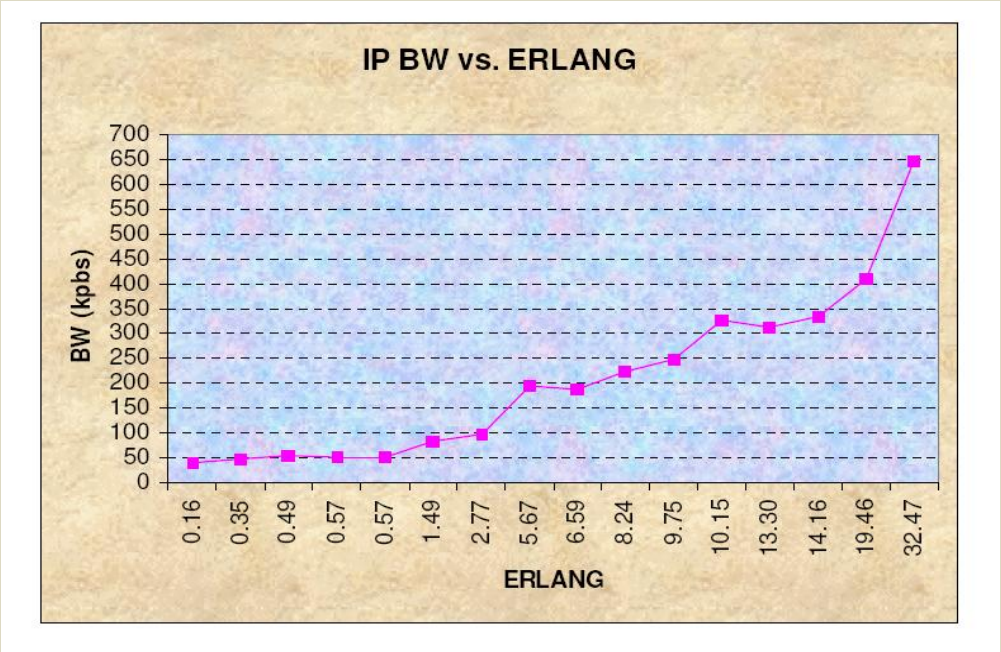
Abis Optimization Savings

- Example: Actual Abis optimized bandwidth in a real life 10 TRX semi-urban site as a function of ERLANG with mixed codec environment and typical conversational silence levels.
- Supporting 10TRX over SCPC would require minimal VSAT allocations of 22 DSOs (or symmetrical 1408kbps circuits) vs Abis optimized bandwidth of 700kbps (50% savings).



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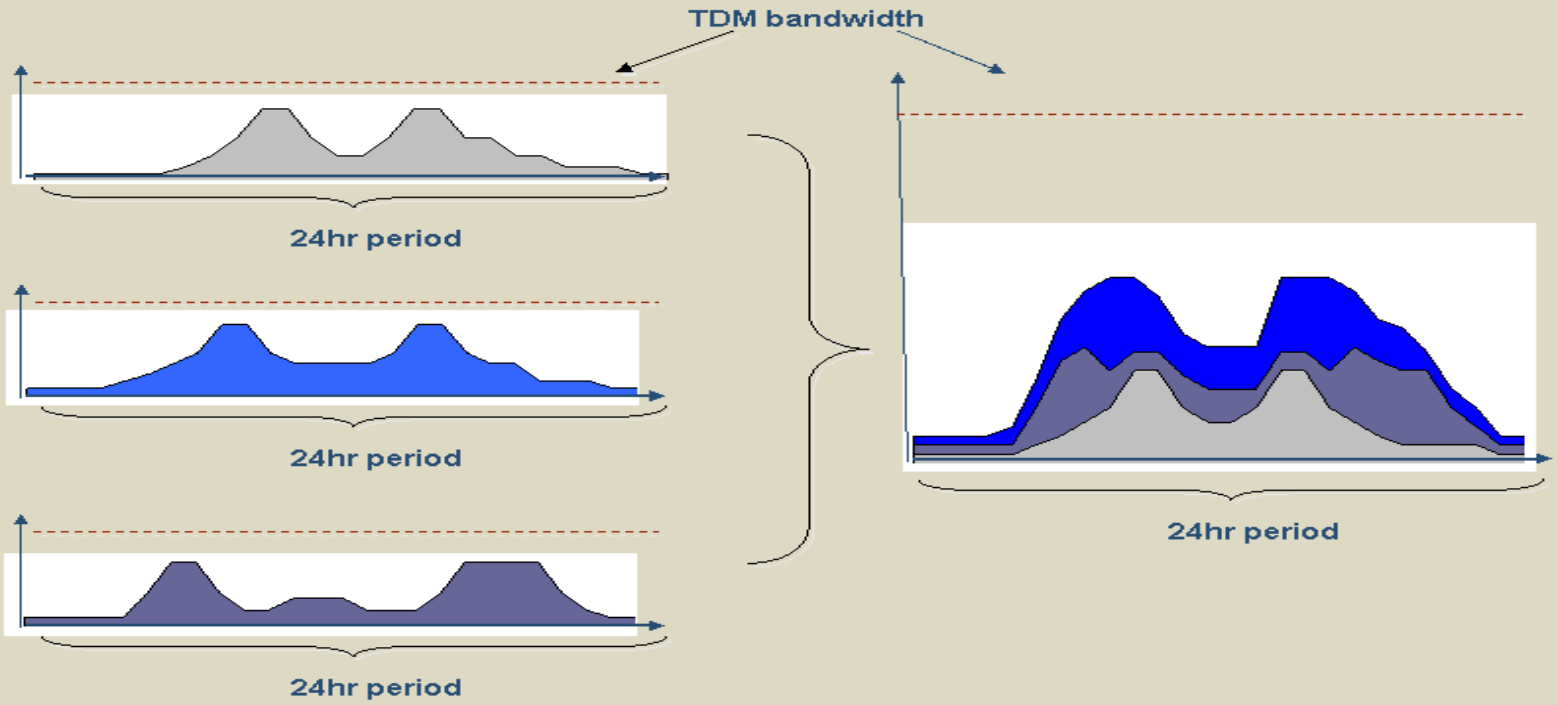
Benefits of Statistical Multiplexing Optimized Abis

Since traffic profiles across residential, highway, or business centers vary, it is not expected that all sites within a network would achieve top ERLANG usage at exactly the same time. Supporting optimized Abis traffic over a bandwidth sharing VSAT solution (DVB-S2/RCS) enables the carrier to derive other efficiencies such as statistical multiplexing gains.



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GPRS/EDGE

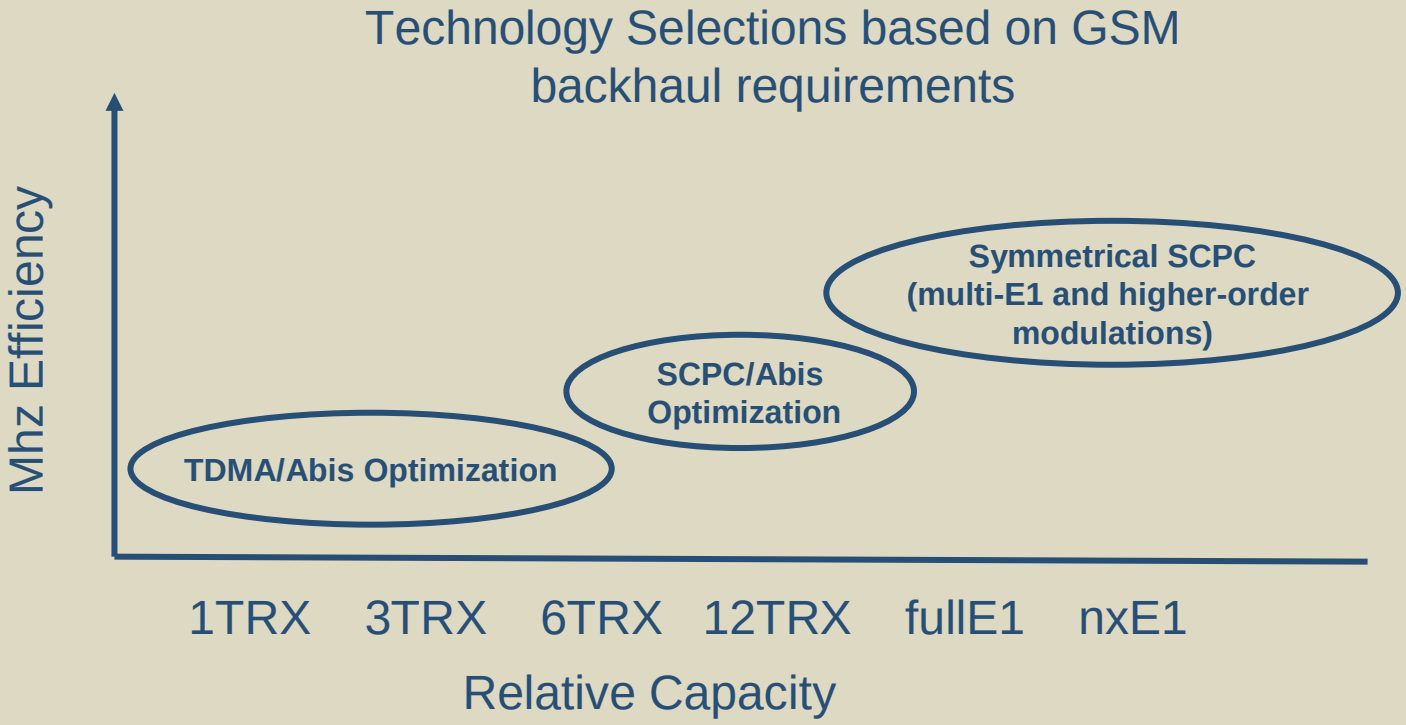
Ericsson executive: “Most carriers have enabled only a single EDGE timeslot over VSAT due to cost vs revenue concerns”…Abis optimization with DVB-S2/RCS resolves this conundrum.”

- GPRS/EDGE usage is typically download oriented with higher number of download channels than upload channels. Over TDM, this means wasted bandwidth since symmetrical capacity is deployed to handle asymmetric traffic.
- The bursty nature of wireless IP data services (GPRS/EDGE) make them ill-suited to transport within traditional T1/E1 DSOs.
- Abis optimization packetizes GPRS/EDGE traffic, converting this traffic from inflexible TDM to the more flexible and efficient statistical multiplexing environment.

Supporting optimized Abis traffic over a bandwidth sharing VSAT solution (DVB-S2/RCS) can save on the order of 3X total bandwidth or more.

GSM Optimal Solutions

- Analysis by Advantech Wireless GSM and VSAT experts have defined optimal system designs based on Advantech products which may be used across a range of GSM networking topologies and sizings.



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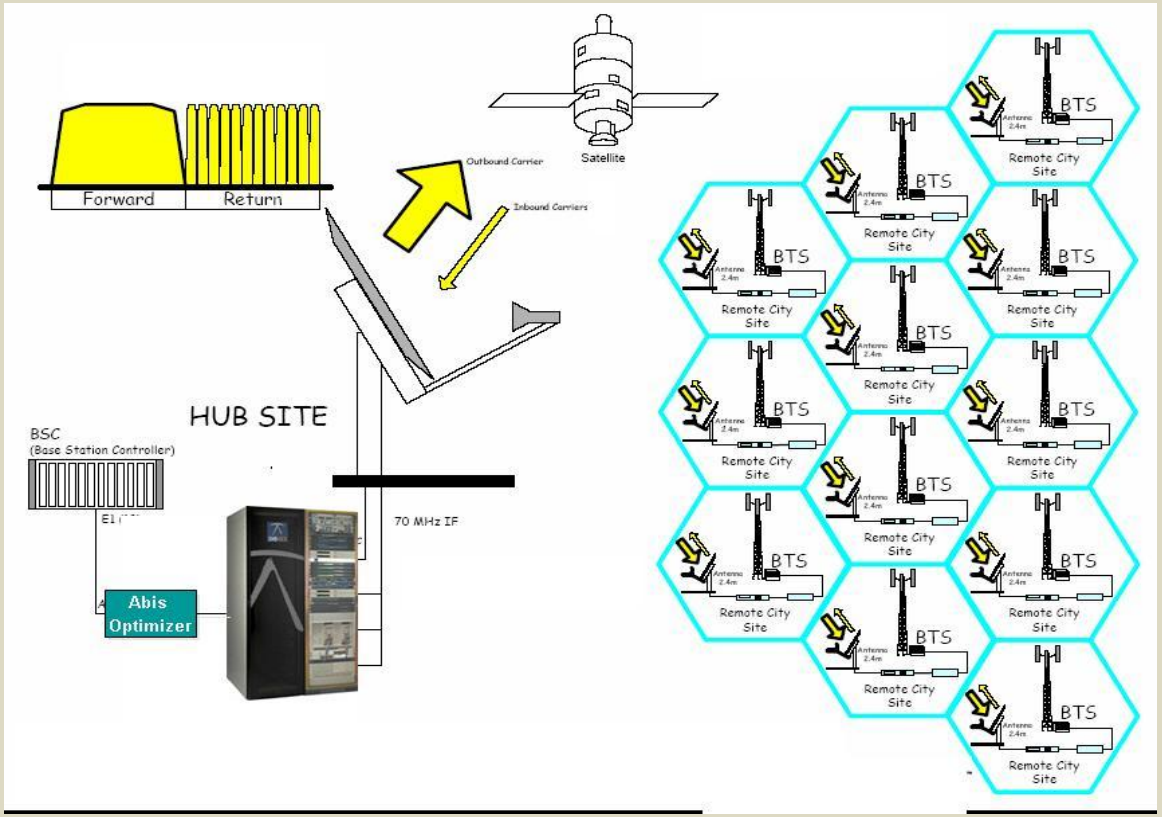
DVB-RCS/Abis Optimization

Advantech Wireless Satellite Communications

- **Advantech Wireless** satellite broadband access technology and products have evolved from almost 40 years of experience in designing and building advanced communications satellite payloads and broadband technology development.
- Advantech Wireless has pioneered the deployment of successive TDMA and MF-TDMA technologies, which are at the heart of the emerging global DVB-RCS air interface standard for 2-way broadband satellite access.
- DVB-RCS is an open standard, which will allow widespread growth through the supply of terminals and hardware from a number of suppliers.

Abis Optimization Over DVB-RCS/S2

- With DVB-RCS/S2 a single carrier can be defined to meet the outbound ERLANG requirement instead of the deployed TDM equivalent capacity of the sites. Return paths can pull bandwidth from a shared bandwidth pool as the needs arise.
- Ideal for large number of remotes with low to medium GSM capacity.



Benefits of DVB-RCS/S2

- Advantech Wireless Pros:
  - Provides highest speed outbound (optimizing potential statistical multiplexing over a larger body of sites) using DVB-S2 and LDPC with 8PSK FEC 4/5 on standard terminals.
  - Adaptive coding modulation (ACM) provides the ability to dynamically modify modulation/FEC to compensate for poor or optimize clear sky bandwidth utilization.
  - The only TDMA (DVB-RCS) solution which can support 8PSK 4/5 modulation on the return channels (providing twice the bandwidth of competitors whom traditionally use only QPSK 2/3).
  - GSM specific features: ability to pre-fetch bandwidth to each GSM supporting node so as to have additional capacity to support calls being placed.

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Benefits of DVB-S2/RCS

- Pros (Cont'd):
  - DVB-S2/RCS can be operated as a Virtual Network Operator (VNO) allowing guaranteed capacity and QOS to different applications (i.e. GSM, WIMAX, CDMA, DCME, or enterprise customers) within their return carrier groups..
  - solutions are available in Micro (effective from dozens to 150 sites), Mini (100 to 1000), and Max (100's to 1000's). Provides low cost startup and simple add-on capabilities so investment maintains value.
  - QoS/TOS implemented to prioritize tagged GSM traffic
  - Lowest delay among all TDMA solution vendors with burst plan updates available every 26.5msecs (vs >100msec for the competition).
- Cons:
  - Additional bandwidth overhead compared to SCPC (True for any MF-TDMA shared access VSAT technology (not specific to DVB-RCS))

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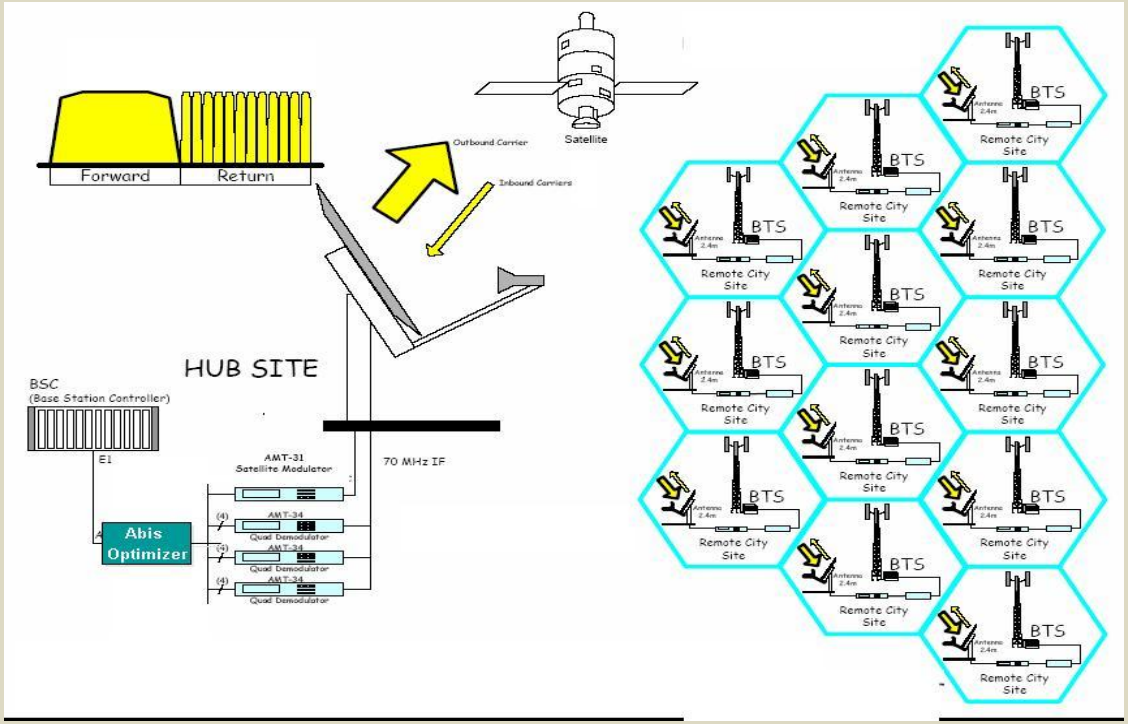
DVB-SCPC with Abis Optimization

Advantech AMT

- **Advantech Wireless** is the world leading Solid State Power Amplifier, Block-up Converter, Converter and Transceiver, advanced VSAT Terminals, Satellite Modems, Data Broadcast Receivers and Antenna Control Systems supplier.
- As winner of Canada's 50 Best Managed Companies Program for three consecutive years Advantech Wireless is committed to providing quality and cost-effective solutions to its customers through endless efforts in research and development.

Abis Optimization Over IP SCPC Modems

- Large forward carrier and powerful SCPC returns provide ideal topology for GSM backhaul (with 3rd party Abis optimization or via CES over IP equipment)
- Ideal for medium to high capacity GSM buildouts.



Benefits of SCPC/Abis Optimization

- Pros:
  - outbound can be DVB-S2 supporting LDPC and can be sized to very high speeds using higher order modulations up to 16APSK.
  - returns can be SCPC carriers supporting speeds up to 4Mbps and using higher modulations up to 8PSK.
  - solutions are scaleable from 1 to dozens of sites. Provides low cost startup and simple add-on capabilities so investment maintains value.
  - Lower delay than TDMA approach.
  - Outbound carrier shares same statistical multiplexing benefit as TDMA approach.
- Con:
  - Return capacities are deployed to meet the max capacity of the site (after Abis optimization) to ensure that site has sufficient bandwidth to meet peaks.

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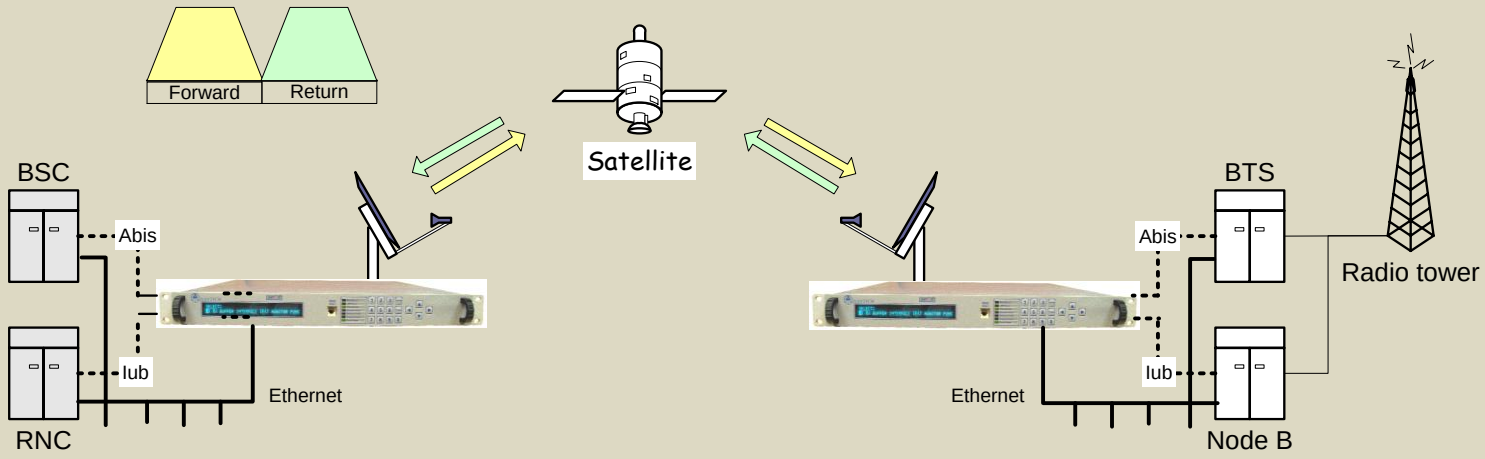
Symmetrical SCPC

(Multi-E1 and Higher Modulation)

Symmetrical SCPC Topology

- Advantech Witreless Telcom modular modems have been specifically designed to simultaneously support both G703 and IP traffic making it ideally suited to today 2G/3G migrations which require mixed mode TDM and IP/Ethernet traffic. The Telcom modem provides the industry's highest order modulations to ensure the highest efficiency of the VSAT link.
- Ideal for single or multi-E1, or mixed mode E1 and IP GSM build outs. Also, ideal for establishing aggregation points for microwave drop off.



Benefits of Symmetrical SCPC

- Pros:
  - outbound/returns can be DVB-S2 supporting LDPC using higher order modulations up to 32APSK or standard SCPC using Turbo Product Code (TPC) and using higher order modulations up to 16QAM.
  - Supports both E1 and IP simultaneously making it ideal for mixed mode traffic delivery to 2G/3G sites.
  - Lowest possible delay for E1 based traffic.
- Con:
  - Site capacities are fixed (no statistical multiplexing benefit possible) so at times of low utilization, bandwidth cannot be diverted to other needs.

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Microwave Solution

(Multi-E1 and 100Base-T Interface)

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Terrestrial Microwave Communications

- Advantech Wireless is a global microwave supplier specializing in high quality point-to-point microwave radios and services.
- Advantech Wireless focuses on lowest cost of ownership and is a pioneer when it comes to Ethernet availability and throughput over the air. We pride ourselves as the only supplier of a 512 QAM radio.
- Advantech Wireless offers SDH/SONET, PDH and Ethernet microwaves radios for both ETSI and ANSI standards.

Microwave portfolio

➔modularity, low/medium/high G.703 and Ethernet capability making them ideal for mixed mode 2G/3G deployments.

AMR Transcend

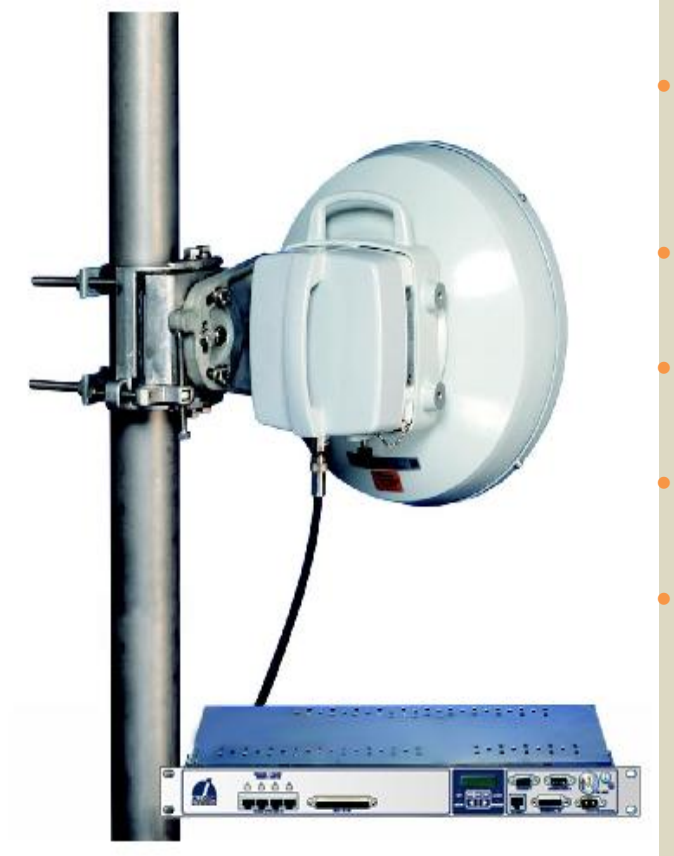
- 7 - 38 GHz
- 8 - 100 Mbps Ethernet + Wayside 4xE1
- Adaptive Coding and Modulation (ACM)
- Layer 2 switch with QoS
- IP based management

Advantech Wireless Transcend™

Key benefits:

- Platform that enables up to 1 Gbps speeds
- Flat throughput: 100bT + 4 E1 on Wayside
- Flexibility in terms of configurations and capacities
- Adaptive Coding and Modulation for longer hops, smaller antennas and higher connection availability
- User friendly, modular and flexible design
- High level software control
- True IP management network (DCN)
- Web and SNMP management
- Network Management via SNMP and NetWay Manager™

Adaptive Code Modulation



access Node Controller (aNC)

- Radio Indoor Unit can change the modulation and coding rate when exposed to fading of the signal
- Increases System Gain, lowers throughput during the fading
- Increases the System Gain 19 dBm in 18 steps.
- Increases availability and possible hop lengths
- Prioritizes E1 traffic, can be combined with Priority functionality of Ethernet.

➔NEW MW RADIO GENERATION

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Conclusion

Advantech Wireless Solution

- The ADVANTECH TRIPLE PLAY

  (DVB-RCS, SCPC, and Microwave solutions)
  - Advantech Wireless is the only company with solutions for all 2G/3G/4G GSM network topologies and sizings.
  - Advantech Wireless is the world leader in DVB-RCS networking and experience.
  - Advantech Wireless is the world leader in satellite RF and modem technology.
  - Advantech Wireless is a leader in microwave innovations (especially w.r.t ACM and high performance)

Advantech should be your partner for GSM backhaul