UNIVERSAL HARDWARE PLATFORM

SATELLITE BACKHAUL
UHP SATELLITE BACKHAUL SOLUTION

Capabilities

• Software-defined network (SDN)
• Support for different standards
• Seamless global coverage
• High-speed connectivity
• Flexible topology and waveforms
• Efficient use of satellite bandwidth
• Easy to deploy, reliable equipment

Advantages

✓ Reduce backhaul costs
✓ Increase revenue and profitability
✓ Improve network performance
✓ Launch new services
✓ Penetrate to new regions
✓ Easy future enhancements
✓ Backup for terrestrial backhaul
WHY USE UHP FOR CELLULAR BACKHAUL?

- **Scalability**: start with a SCPC link and SW migrate to a TDM/TDMA network
- **DVB-S2X bandwidth-efficient** modulation and coding
- Highest **TDMA efficiency**: 96% and fast BW allocation
- Highest **transmit capability**: 450 Mbps aggregate
- Extremely high processing capability up to **190K PPS**
- Robust **L2** interface can carry Metro Ethernet traffic, as well as **Layer 3**
- NMS with XML-based **API** for easy integration with OSS/BSS
- Sophisticated **QoS** with built-in 2G, 3G & LTE **backhaul optimization**
- **Field proven** with major Mobile Network Operators in the USA
SATELLITE BACKHAUL

UHP NETWORK DIAGRAM

- 3G Iuh & LTE S1 Decoding and Encoding
- Optimization & Offload
- TCP Acceleration
- DVB-S2X modulations
- Adaptive coding and modulations
- Various waveforms
- Any network topologies

Supported waveforms:
- SCPC P2P
- TDM/SCPC
- TDM/TDMA
SCPC vs TDMA
SATELLITE BACKHAUL DILEMMA

**SCPC:**
- Dedicated bandwidth
- High MODCODs
- Low latency and jitter

**TDMA:**
- Bandwidth sharing
- Statistic multiplexing
- Burstable throughput

Find the middle ground: use both
- TDM forward channel with CIR and QoS with unlimited MIR
- MF-TDMA return channels with data rate up to 27 Mbps per carrier and 96% efficiency vs SCPC
- Dedicated SCPC or on-demand SCPC-DAMA return channels up to 225 Mbps with up to 64APSK
- SW-controlled switchover between SCPC and TDMA waveforms
INTELLIGENT BACKHAUL OPTIMIZER
COMPREHENSIVE SET OF APPLICATIONS FOR 2G, 3G AND LTE

UHP-231 INTELLIGENT ROUTER WITH SBC

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Interoperable with all mainstream mobile technology vendors:
UHP-231
INTELLIGENT ROUTER

- Standard UHP-230 router
- Embedded Edge Application Computer (EAC) for:
  - Cellular backhaul optimization
  - Enhanced IP traffic optimization and acceleration
  - Specialized software for M2M and IoT equipment
  - Proprietary customer’s applications
WHAT OUR CUSTOMERS SAY ABOUT UHP?

- Packets per second of HUB and remote with LTE Optimizer
  - ✓ “We HIT the system with 128.000pps @64byte and the system was able to handle it without a single packet lost, there is no satellite modem on the market that support that load”

- Fast start up
  - ✓ “UHP reboots and come back online in ~12 seconds so despite the Base station disconnect and reconnect the calls are not dropped (just 12 seconds of silence)”

- Robustness of QoS
  - ✓ “Having a 45Mbps OC and 5Mbps IC; We tested QoS with 7 Priority Levels where HUB was loaded with 400Mbps of Level 1 traffic (both sides) and system was able to process and transmit higher Queues without problems”

- Low Jitter
  - ✓ ”With Current TDMA frame configuration, the system was supposed to have a max jitter of 15ms. However, when the Load tests were in progress Jitter never went over 2~5ms”

- Quick resolution of issues
  - ✓ “Certain issues were faced during thorough LTE approval tests (in some extent it was expected); other vendors took weeks to fix similar problems and UHP fixed it in a matter of hours”
UNIVERSAL HARDWARE PLATFORM

DISRUPTIVE INNOVATIONS
SOFTWARE DEFINED NETWORK

- Universal routers for all network roles
- Dynamic SW-definable mode of operation
- Quick and easy transfer/swap of the functionality SW licenses
- Reduced CAPEX for spare parts and network upgrades
- Quick and easy field replacement and change of network topology

- Powerful L3/L2 router with 190’000 pps
- Mesh: eliminate double bandwidth allocation
- Multiple configuration profiles
- Embedded Computer for advanced applications and traffic processing
- Sophisticated QoS with VLAN management and built-in 2G, 3G & LTE backhaul optimization
BANDWIDTH EFFICIENCY

- Dual DVB-S2X demodulators with separate IF inputs
- Up to 500 Msps DVB-S2X ACM up to 256APSK
- Integrated high-speed DVB-S2X modulator for SCPC return channel
- Proprietary encapsulation with 99% efficiency and advanced QoS
- Up to 20% savings on bandwidth

- Multichannel MF-TDMA LDPC demodulator
- 12 MODCODs with QPSK, 8PSK & 16APSK
- Data rates up to 27 Mbps/terminal
- Hubless and Mesh topologies
- Highest TDMA efficiency of 96% and flexible frame structure
- >20% advantage over other TDMA implementations
MULTI-SPOT HTS HUB

- Designed for multi-spot HTS networks
- Based on low-CAPEX universal controllers
- Required functionality is activated by SW license as network develops
- Easy SW license transfer between teleports, beams and satellites
- Cost-effective scalability up to 64 spot-beams and 500,000 terminals
- Self-healing network architecture
- Dynamically assigned network roles
- Automatic M:N local and geographic redundancy
- M:N site diversity with multiple teleports for increased availability
- Saves over 40% of Hub CAPEX due to functionality SW license reuse
DUAL-GATEWAY

- Hierarchical multilevel topologies with basic STAR terminals
- Direct connectivity of the terminal with the Hub and respective Gateway
- Unlimited number of regional Gateways
- High spectral efficiency of all TDM channels of the Hub and Gateways
- Compatible with multi-sport HTS satellites and dual-band solutions
- Dual-Gateway ensures more than 50% savings compared to Mesh network
BEAM SWITCHING

- Preconfigured, locally-stored coverage maps and network parameters
- Automatic round-robin and map-based switchover between satellites or beams
- Change of mode of operation when required
- Automatic adjustment of uplink power and Doppler effect compensation up to 1300 km/h
- Communications with mobile antenna based on standard OpenAMIP protocol
- COTM terminal retains the same IP address after switchover to another hosting network
QUALITY OF SERVICE

- Classification of IP packets
- Customized action rules
- Traffic policy manager
- Multichannel hierarchic traffic-shaper:
  - CIR – committed data rate
  - MIR – maximum data rate
  - MIR to CIR slope factor
  - Day/Night CIR change
- Multiple Tx priority queues with Class-Based Queueing