UNIVERSAL HARDWARE PLATFORM

CARRIER-GRADE VSAT TECHNOLOGY

JANUARY 2019 (Revision 3.5X)
UHP NETWORKS AT A GLANCE

- Developer and manufacturer of industry’s first software-defined, high-throughput VSAT technology with best total cost of ownership
- Head Office in Montreal, Canada; manufacturing in EU and Canada; sales and support offices around the world
- Installed 370 networks and 40,000 remote terminals, operated by Tier-1 telecom and utility companies, major broadcasters in over 50 countries
WHY USE UHP?

- **One-for-all** technology: Software-Defined Functionality
- **Made for HTS** VSAT with support of multiple beams and frequency bands
- Efficient **DVB-S2X** MODCODs and highest **TDMA efficiency**: 96%
- **Mesh** capability: eliminate double bandwidth allocation due to double hop
- Layer 3 routing architecture and **Layer 2** bridging mode
- Superior IP router **productivity** and rich set of supported protocols with **QoS**
- NMS with support of **VNO** and **API** for interfacing with OSS/BSS, etc.
- **Smallest**, lowest power consumption, most **reliable** IDU
- The most versatile and lowest-cost hub with **M:N local/geo-redundancy**
KEY FEATURES

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
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ENTERPRISE NETWORKS
WHY USE UHP FOR ENTERPRISE NETWORKS?

- **One-for-all** technology: Software-Defined Functionality
- Highest **transmit capability** from remote: 225 Mbps
- Smallest, lowest power consumption, most **reliable** IDU
- **AES-256** encryption of user data and network management
- **NMS with API** for interfacing with OSS/BSS, etc.
- **Mesh** capability: eliminate double bandwidth allocation due to double hop
- **VNO** capability with hierarchical traffic shaper
- **QoS**: support for **VoIP** with cRTP header compression + **Video** over TDMA
- High availability: **Local-/Geo- Redundant** Teleports with Fast switchover
OFFICE CONNECT AND BUSINESS CONTINUITY

- Broadband connectivity for primary and offload/backup lines to regional offices
- The same level of access and enterprise applications for all remote employees
- Efficient voice and video collaboration and M2M data transmission in one network
- High-throughput terminals with burstable TDMA or dedicated SCPC channels
- Various QoS levels and support of VoIP, videoconferencing, IP multicast, etc.
- Content delivery (training, software etc.)
Seamless communications for remote branches, trade machines and mobile offices
- Secure and reliable infrastructure for critical financial transactions
- Voice and video connection with remote branches for collaboration and training
- Corporate TV and dynamic digital signage
- Surveillance video for all branches
- Two-way terminals with burstable TDMA or dedicated SCPC channels for backup
ENERGY & UTILITY

- Reliable communications for rigs, vessels, pipelines and remote offices
- One network for business applications, SCADA traffic, surveillance and crew welfare
- Efficient capacity use and burstable throughput thanks to dynamic bandwidth allocation
- Real-time transmission for critical data and remote management
- High scalability and flexible topologies
- Autonomous terminals with low power consumption and suspend mode for SCADA
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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:

- ERICSSON
- MOTOROLA
- NOKIA
- Alcatel-Lucent
- ZTE
- IP Access
- HUAWEI
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”
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COMMUNICATION ON THE MOVE
UHP COTM

Capabilities
• Support for different antennas
• Seamless global coverage
• High-speed connectivity
• Flexible topology and waveforms
• Efficient use of satellite bandwidth
• Easy to deploy and operate
• Reliable equipment with redundancy

Advantages
✓ Scalable solutions applicable for fishing boats, SNG and cruise ships
✓ Meets demands of the most complex mobility applications
✓ Reliable broadband access for the crew and passengers everywhere
✓ Efficient multiservice VSAT platform for fixed and COTM terminals
WHY USE UHP FOR COTM?

- Bandwidth-efficient DVB-S2X modulation and coding
- Highest **TDMA efficiency**: 96% and fast BW allocation
- Support for cellular backhaul 2G/3G/LTE traffic for wireless roaming onboard
- **OpenAMIP** and other proprietary protocols to interface with mobile antennas
- Automatic **beam switching** with change of frequencies and mode of operation
- Support for multi-spot **High-Throughput Satellites**
- **Doppler effect** compensation up to 1300 km/h speeds
- Compact, light-weight, low-power **router board for integration** into antennas
COMMUNICATION ON THE MOVE
TDM/SCPC NETWORK

- Dedicated SCPC channels to each ship
- MODCODs up 64APSK in both directions
- Data rates up to 225 Mbps in both directions
- Shared forward (TDM) channel with statistical traffic multiplexing and advanced QoS
- Low-CAPEX scalable TDM/SCPC Hub that can be software-upgraded to TDM/TDMA Hub
- Recommended for networks with a small number of terminals and very intensive traffic, e.g. cruise ships with Tx traffic above 10 Mbps
COMMUNICATION ON THE MOVE
TDM/TDMA NETWORK

- Forward (TDM) channel with DVB-S2X MODCODs and 225 Mbps throughput
- MF-TDMA return channel with MODCODs up to 16APSK and throughput up to 27 Mbps/carrier
- Automatic ACM and TLC in both directions
- Dynamic bandwidth allocation with intelligent QoS both in forward and return channels
- Recommended for networks with multiple terminals and modest traffic in return channel, e.g. cargo/small ships, airplanes, SNG vehicles
COMMUNICATION ON THE MOVE
TDM/SCPC MULTI-SPOT NETWORK

- Dedicated SCPC channels to each ship
- MODCODs up 64APSK in both directions
- Data rates up to 225 Mbps duplex
- Shared forward (TDM) channel with statistical traffic multiplexing and advanced QoS
- Requires forward TDM channel and capacity for SCPC return channels in each spot-beam
- Automatic beam switching
- Recommended for networks with a small number of terminals and very intensive traffic, e.g. cruise ships with Tx traffic above 10 Mbps
COMMUNICATION ON THE MOVE
TDM/TDMA MULTI-SPOT NETWORK

- Forward (TDM) channel with DVB-S2X MODCODs and up to 225 Mbps throughput
- MF-TDMA return channel with MODCODs up to 16APSK and throughput up to 27 Mbps/carrier
- Requires TDM/TDMA subnetwork in each spot-beam of the target coverage
- Supports automatic beam switching with TDM/TDMA or TDM/SCPC network topologies
- Recommended for networks with multiple terminals and modest traffic in return channel, e.g. cargo/small ships, airplanes, SNG vehicles
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MISSION-CRITICAL APPLICATIONS
SUMMARY OF B2G REQUIREMENTS

- Universal Functionality & Topology
- Bandwidth Efficiency and Performance
- HTS Compliant Architecture
- Multipurpose Terminals
- Traffic and Management Security
- Mobility and Portability
- Superior Reliability and Availability
- Localization Options
WHY USE **UHP** FOR MISSION-CRITICAL APPLICATIONS?

- **One-for-all** technology: Software-Definable Satellite Router
- Ready for integration with **manpack** antenna systems
- **Ultra-fast start** and extended operational temperatures
- **Ruggedized outdoor Hub** for field-deployable networks
- Support of C-, X-, Ku- and Ka-bands, including **HTS**
- **Mesh** capability: eliminate double bandwidth allocation
- **QoS**, support for VoIP and Video over TDMA with controlled jitter
- **Ultra-low latency** VSAT system with round-trip delay about 570 ms for TDMA
- Support of **OpenAMIP** and other protocols to interface with mobile antennas
AIR TRAFFIC CONTROL

- Reliable connectivity for flight controllers
- Support of real-time data, voice and video
- Single-hop Full-Mesh TDMA topology
- Round-trip delay below 570ms
- Dynamic bandwidth allocation
- Single-carrier or MF-TDMA network
- Efficient modulations and ACM
- 1:1 automatic redundancy of terminals
- No single point of failure
BORDER CONTROL & EMERGENCY RELIEF

- Fixed, fast-deployable and mobile terminals
- Support of real-time data, voice and video
- Backhaul for fast-deployable cellular networks
- Dynamic TDMA bandwidth allocation
- Star, Multilevel or Mesh topologies
- Dedicated and on-demand SCPC channels
- Efficient modulations and ACM
- Secure AES-256 encryption of traffic
- 1:1 automatic redundancy of terminals
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MEDIA NETWORK
WHY USE **UHP** FOR MEDIA NETWORKS?

- Universal network for content **contribution and distribution**
- High-speed **DVB-S2X broadcasting** up to 225 Mbps
- Powerful **IP router** with Gigabit Ethernet ports
- Dynamic **bandwidth allocation** for DSNG transmissions
- **Mesh** capability: eliminate double bandwidth allocation
- **QoS**, support for VoIP with cRTP header compression, Video over TDMA with controlled jitter, TCP acceleration
- **Ultra-low latency** VSAT system with round-trip delay about 570 ms for TDMA
- Best network availability: **Local-/Geo- Redundant** Teleports
IP BROADCAST AND CONTENT DELIVERY

- Live, on-demand or offline content broadcasting for IPTV headend stations
- Secure and reliable content delivery to digital cinema theaters
- Data throughput up to 225 Mbps per channel
- Bandwidth-efficient DVB-S2X modulations
- Delivery via AES-256 encrypted channels
- Rx-only receivers or two-way terminals for interactive applications with dual demodulators
SATELLITE NEWS GATHERING

- High-speed video streaming and two-way voice/data from hard-to-access locations
- Dynamic satellite bandwidth allocation for SD, HD or Ultra-HD transmissions
- Shared 27 Mbps MF-TDMA or dedicated 225 Mbps SCPC carriers on demand
- Support of OpenAMIP and other proprietary protocols to interface with mobile antennas