HORIZON HARMONY

CONVERGED PACKET MICROWAVE SYSTEM

SEAMLESSLY BACKHAUL YOUR EXISTING T1/E1 TRAFFIC, AND RAPIDLY-GROWING PACKET-BASED TRAFFIC, ALL WITHIN A SINGLE PLATFORM.

The Horizon Harmony split-mount system achieves significant efficiencies by converging TDM, ATM, Frame Relay, IP and Ethernet traffic onto a single packet-based transport layer and a single management plane. This results in simplified operations, reduced capital cost and significant savings in total cost of ownership; all while meeting the most stringent network requirements for highly time-sensitive applications.

Unlike existing hybrid solutions, which offer packet capabilities but are optimized for legacy services, the Horizon Harmony is positioned for the future with a packet-based architecture that still provides complete support for TDM circuits. This approach enables operators to evolve their network gradually over time as their traffic and service mix changes, arriving at an uncompromised end-state network that is optimized for next generation applications and services.

This carrier-grade converged packet microwave system operates in licensed and unlicensed spectrum from 6 to 60 GHz.

SOLUTION HIGHLIGHTS

- 1 to 2 Gbps capacity with DragonWave's Bandwidth Accelerator
- 6–60 GHz frequency support
- Gigabit Ethernet interfaces
- Integrated RF and TDM loopbacks
- Hitless Automatic Adaptive Modulation (HAAM)
- Advanced Ethernet capabilities: port-based VLAN tagging/switching, Ethernet OAM
- IETF PWE3-based capabilities – Circuit Emulation Service (CES), ATM, FR and HDLC
- Industry-leading CES including enhanced jitter management
- Optional High Precision Clock Recovery (HPCR®) – the industry's most robust adaptive clock recovery technology
- Advanced QoS mechanisms: per-port rate limiting, DiffServ, Ethernet VLAN 802.1q/p
- Seamless interoperability with all generations of mobile base stations
- Single management and provisioning with DragonVision network management system
- Flexible radio unit can be deployed in link or nodal applications

Channel Bandwidth	Modulation	Rx Sensitivity	Base Throughput	With Bandwidth Accelerator		Tx Power
				Typical Mobile Traffic Mix	Maximum Throughput	
56 MHz	QPSK / 32QAM / 256QAM	-82/-72/-61	65/216/385	90/300/540	160/540/1000	27/21/19.5
50 MHz	QPSK /32QAM / 256QAM	-83/-74/-61	67/171/364	95/240/500	170/430/900	27/24/19.5
40 MHz	QPSK /32QAM / 256QAM	-83/-75/-62	57/142/277	80/200/390	145/350/700	27/23/19.5
30 MHz	32QAM / 128QAM / 256QAM	-77/-70/-64	107/165/212	150/230/300	270/410/530	20/23/19.5
28 MHz	QPSK / 32QAM / 256QAM	-86/-77/-66	48/100/190	70/140/265	120/250/475	23.5/21/19.5
20 MHz	16QAMK / 32QAM / 256QAM	-86/-82/-66	28/54/142	40/75/200	70/135/350	27/23/19.5
14 MHz	QPSK / 32QAM / 256QAM	-89/-76/-70	23/47/95	30/65/130	60/120/240	23.5/23/19.5
10 MHz	QPSK / 64QAM / 256QAM	-89/-76/-70	14/48/65	20/70/90	35/120/160	27/21.5/21
7 MHz	QPSK / 64QAM / 128QAM	-90/-80/-76	11/33/39	15/45/55	30/80/100	27/20.5/20

HORIZON HARMONY

Product Specifications

FREQUENCIES

• 6 GHz	FCC/IC/ETSI/ITU
• 7 GHz	ETSI/ITU/MX
• 8 GHz	ETSI/ITU
• 11 GHz	FCC/IC/ETSI/ITU
• 13 GHz	ETSI/AUS/NZ/ITU
• 15 GHz	IC/ETSI/AUS/NZ/MX/ITU
• 18 GHz	FCC/IC /ETSI/AUS/NZ/ITU
• 23 GHz	FCC/IC/ETSI/AUS/NZ/ITU/MX
• 24 GHz UL	FCC/IC/ETSI
• 24 GHz DEMS	FCC/IC
• 26 GHz	ETSI
• 28 GHz	FCC/ETSI
• 32 GHz	ETSI
• 38 GHz	FCC/ETSI/AUS/NZ/MX
• 60 GHz	UNLICENSED

PHYSICAL INTERFACES

E1
- Number of Ports: 4 or 8
- Standards Compliancy
  - ITU G.703, G.704, G.706, G.732
- Jitter and Wander Performance
  - ITU G.823, G.8261
- Connectors
  - Balanced RJ-45, 120 Ω
  - Unbalanced BNC 75 Ω connectors via an optional adapter cable

T1
- Number of Ports: 4 or 8
- Standards Compliancy
  - ANSI T1.403, Telcordia TR-62411
- Jitter and Wander Performance
  - Telcordia TR-62411, ITU G.824, G.8261
- Connectors: Balanced RJ-45, 100 Ω

ETHERNET
- Ports
  - 3x 10/100BaseTx (User or Network)
  - 2x 100BaseFx/1000BaseX (User or Network)
- Standards Compliancy
  - 802.3 (Fixed settings, auto-negotiation)
  - 802.1q/p
- Connectors
  - 10/100BaseTx – RJ-45
  - 100BaseFx – LC duplex (SFP)
  - 1000BaseX – LC duplex (SFP)

POWER

ODU
- Input: -40.5 VDC to -56 VDC
- Optional Adapter: 110/240 VAC
- Consumption
  - 25 Watts (per link end)
  - 54 Watts High Power (per link end)

IDU
- Input
  - DC Power: ±18 to ±72 VDC
  - AC Power: 90 to 264 VAC
- Consumption
  - 9W
  - 14W (with HPCR and redundant power)
- Field replaceable power supply: Yes*
- Redundant power supply: Yes*
  *Available option (1 RU)

MECHANICAL
- ODU (without antenna)
  - 10.2 cm x 24.3 cm x 22.1 cm; 3.4 kg
  - 4 in x 9.6 in x 8.7 in; 7.5 lbs
- IDU
  - 4.45 cm x 23 cm x 20.8 cm
  - 1.7 in x 9.41 in x 8.2 in
- Power Adapter (optional)
  - 15 cm x 7 cm x 3.5 cm
  - 5.91 in x 2.76 in x 1.38 in
- Antenna Wind Loading
  - 112 kph (70 mph) Operational
  - 200 kph (125 mph) Survival
- Antenna Mount Adjustment
  - +/- 45° Az; +/- 22° El

CONNECTIONS
- Power: -48V, POE
- Payload (+ Inband NMS): RJ-45 or optical LC
- NMS (when out-of-band: RJ-45

NETWORK MANAGEMENT
- Alarm Management: SNMP Traps, Enterprise MIB
- NMS Compatibility
  - DragonVision NMS
  - Any SNMP-based network manager
  - SNMP v1, v2 c and v3
  - Web based management
- Security 3 Level Authentication
- Interface
  - Type: CLI (RS-232 / Telnet / SSH2)
  - Connector: DB-9, female
- TDM & Ethernet Alarms

OAM & DIAGNOSTICS
- Ethernet OAM
  - Ethernet Link OAM (IEEE 802.3ah)
  - Ethernet service OAM
  - (IEEE 802.1ag / ITU-T Y.1731)
- Loopback Support
  - Terminal (local)
  - Facility (remote)
  - In-band
  - Far end in-band
  - FDL
  - Modem, Microwave loopback

QOS MANAGEMENT
- Prioritized Queuing (SP): 8 Levels served by 8 hardware queues
- Layer 3 Marking: DiffServ
- Layer 2 Marking: VLAN 802.1Q/P
- Jitter buffer: Programmable up to 256 msec
- Packet Cut-Through: Yes

PERFORMANCE
- Capacity w/Accelerator
  - Variable from 10 to 1000 Mbps full duplex CIR
  - 2x capacity up to 2 Gbps with DPRM
- Base Capacity
  - Variable from 10 to 400 Mbps full duplex CIR
  - 2x capacity up to 800 Mbps with DPRM
- Latency GigE: < 200µs, Typical 120µs GigE
- Packet Size: 64 to 9600 Bytes
- Flow Control: Yes
- Modulation Shifting:Yes, Hitless
- PWE Services
  - TDM-CES, ATM, HDLC/PPP, FR

TIMING
- Adaptive Clock Recovery (ACR)
- High Precision Clock Recovery (HPCR®); optional
  - Telcordia TR-62411, ITU G.823, G.824, G.8261
- Internal: ±25 ppm (non-HPCR)
- Loopback timing

ENVIRONMENTAL
- Operating Temperature
  - ODU: -40° C to + 50° C (-40° F to +122° F)
  - ODU, Std pwr with heat shield: -40° C to + 60° C (-40° F to +140° F)
- IDU: -40° C to + 65° C (-40° F to +149° F)
- Humidity
  - ODU: 100% condensing
  - IDU:Up to 95% non-condensing
- Altitude: 4500 m (14,760 ft)
- Water Tightness: Nema4X, IP56 (directed hose test)
- Operational Shock: ETSI 300-019-1-4; 5g 11ms
- Operational Vibration: ETSI 300-019-1-4 Class 4m5, NEBS GR-63
- Earthquake: NEBS GR-63

DragonWave