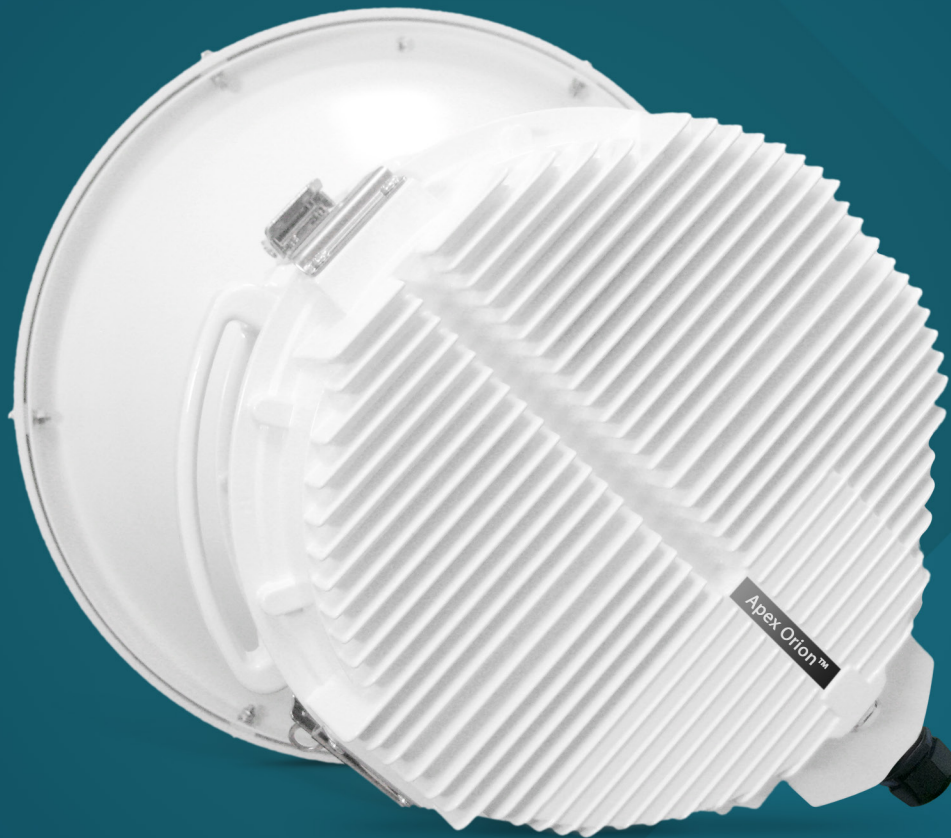


Apex Orion™ DATASHEET

4.5 - 42 GHz
Carrier-Class | Licensed | All-Outdoor
MICROWAVE BACKHAUL SYSTEM



PART OF
Orion™ Series



Apex Orion™ Overview

The Apex Orion is an ultra-high performance all-outdoor point-to-point wireless microwave system designed for carrier, enterprise, service provider, and government networks. The system is available for all standard licensed frequency bands from 4.5 to 42 GHz.

The Apex Orion offers modulation levels up to 1024QAM, Physical Link Aggregation, and XPIC enabling full gigabit performance. Other outstanding features include hitless advanced adaptive coding and modulation, comprehensive management and monitoring capability, and industry leading system gain.

The system includes both fiber and copper Gigabit Ethernet interfaces with in-band and out-of-band management, and can be powered directly or over Ethernet using a PoE injector.

Features

Performance

- Up to 761 Mbps full duplex Layer 2 Ethernet throughput in a single polarity 60 MHz channel using multi-layer header compression
- Up to 1.5 Gbps full duplex in 2+0 configuration
- High Power radios coupled with LDPC provides industry-leading system gain
- 3.5-60 MHz Channel Bandwidth
- QPSK through 1024QAM
- 8 MB programmable packet buffer to absorb bursty traffic and improve TCP performance
- Multilayer header compression to increase capacity
- Ultra-low latency & jitter in all ACM modes

Advanced Networking

- Physical Link Aggregation (PLA) enables 2+0 operation at physical link level – not dependent on IP hashing or multiple IP streams
- Cross Polarization Interference Cancellation (XPIC) enables operation on both polarities of a single channel
- 9 level hitless Advanced Adaptive Coding & Modulation (AACM) to provide link reliability in degraded channel conditions
- Diffserv, and VLAN QoS with 8 queues and strict/DWRR scheduling
- Automatic transmit power level increase on modulation downshift for improved system gain during fading (Adaptive Power Control)
- 1+1 Hot Standby with Rapid Port Shutdown (RPS)
- Port mapped traffic via user assigned VLANs

Interface

- 2 GigE Interfaces (1 Copper, 1 SFP/Fiber) for payload
- PoE simplicity with single Cat5e cable installation or direct fiber connect

Synchronization

- Sync-E clock transport over microwave
- IEEE1588v2 timing over packet support (Transparent Clock)

Security & Management

- AES-256 Encryption option (Requires software key)
- Secure management via browser and SSH (In-band and out-of-band) as well as SNMP

Mechanical

- All-outdoor, rugged, durable and compact form factor requires no rack space
- Dual input power supply support (Redundant) -48V power
- Industry's highest temp spec - up to +65°C (149°F)
- FCC/ETSI Compliant
- Standard 1-Year Manufacturer's Warranty

System Specifications

General Parameters	
Model Numbers	TLAOx (Full link consisting of two units), AOX (Apex Orion individual unit)
Frequency Support	4.5-42 GHz Frequency Division Duplex (FDD)
Channel Size †	3.5, 5, 7, 8.33, 10, 12.5, 13.75/14, 20, 25, 27.5/28, 30, 40, 50, 55/56, 60, 80 MHz
Modulation Format	Selectable: QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 512QAM, 1024QAM
Max Uncompressed Capacity	490-750 Mbps full duplex – Varies by modulation, bandwidth, and packet mix
Payload Latency	200 µs typical
Payload Types	Ethernet (IPv4 and IPv6 compatible)
Features	ATPC (Automatic Transmit Power Control) Hitless ACM (Adaptive Coding and Modulation) LDPC Forward Error Correction XPIC (Cross Polarization Interference Cancellation)
Regulatory Compliance †	FCC CFR47 Part 101 ETSI EN 302 217-1 ETSI EN 302 217-2 ETSI EN 301 489-1 EMC ETSI EN 301 489-4 EMC CANADA SRSP FCC/ANSI: FCC Part 15 Class A Unintentional Radiator RoHS
Safety	EN60950-1
MTBF	> 18 years

Ethernet Parameters	
Packet Size	64-9600 bytes
Ring Protection	ERPS (G.8032), RSTP, MSTP (Future release)
Link Aggregation	Physical Link Aggregation (PLA)
Quality of Service (QoS)	802.1p Port prioritization Diffserv (DSCP) MPLS Port mapping for traffic Support for up to 8 Classes of Service (CoS) Bandwidth shaping per port Strict & DWRR scheduler Packet Buffer 8 MB
Data Security	AES-256 option (Requires software key)

Management	
Security / Authentication	2 level password (Read only, read/write)
Configuration & Management	Telnet, SSH, HTTPS, Console (RS232), SNMPv2
Remote Firmware Update	FTP/TFTP server in radio unit

Interfaces	
Indicators	Ethernet speed and activity for each port; Link indicator LED 1 BNC-F for receive signal level voltage
Payload Interfaces	1x GigE RJ45 (10/100/1000BaseT), PoE capable 1x GigE Fiber/Copper SFP 1x GigE Fiber/Copper SFP (PLA)
Out-of-Band Management	Ethernet port RJ45, PoE capable, 10/100/1000BaseT
1+1 Hot Standby	12 pin circular
XPIC IN / OUT	SMA-female (2)
Power Connector	2 Pin Terminal Block for direct power or PoE over GigE data or management port
Console	DB9 RS232-115200, N, 8, 1 with optional SFP module
Sync-E Source	Selectable (ETH1 Copper) or (ETH2 SFP)

Antenna	
Supported Types	High performance dish antenna - 1, 2, 3, 4 & 6 foot options
Interface	Direct slip-fit mount or remote mount using standard waveguide

† Legal regulations for specific frequencies vary from region to region. Users are responsible for complying with their local regulations.

Power	
Input	-45 to -72 Vdc direct or using PoE
Power Consumption	48 to 72 Watts dependent on sub-band
Power Protection	Reverse polarity and transient clamping to 100 volts

Mechanical & Environmental	
Enclosure	Cast Aluminum, PoE Injector: Polycarbonate
Dimensions (Height x Width x Length)	11 x 11 x 6 in. / 28 x 28 x 15.2 cm PoE Injector: 3.25 x 5.125 x 8.5 in. / 8.25 x 13 x 21.6 cm
Weight	13.1 to 15.1 lbs / 5.9 to 6.8 kg dependent on sub-band
Temperature Range	-40° to 131° F / -40° to +55° C (Spec compliant) -40° to 149° F / -40° to +65° C (Operational)
Humidity	100% condensing
Antenna Connector	Slip-fit mount / Optional remote mount: for standard waveguide sizes

Receive Sensitivity In dBm (6-26 GHz)

Channel Width (MHz)	QPSK	8PSK	16 QAM	32 QAM	64 QAM	128 QAM	256 QAM	512 QAM	1024 QAM
3.5	-96.6	-93.3	-90.4	-86.4	-84.0	-80.9	-77.9	-74.4	-70.9
3.75	-96.4	93.1	90.2	86.2	83.8	80.7	-77.7	-74.2	-70.7
5	-94.4	-91.4	-88.8	-84.8	-82.1	-79.0	-76.0	-73	-69.6
7	-93.3	-90.7	-87.7	-83.7	-81.3	-78.2	-75.2	-71.4	-67.9
8.33	-92.7	-89.7	-86.5	-82.5	-80.3	-77.5	-74.4	-71.0	-67.4
10	-92.2	-89.0	-86.0	-82.0	-79.6	-76.5	-73.5	-70.1	-66.6
12.5	-91.3	-88.3	-85.4	-81.1	-78.7	-75.4	-72.4	-69.0	-65.5
14	-90.5	-87.3	-84.3	-80.3	-77.9	-74.8	-71.8	-68.4	-64.9
20	-89.0	-85.8	-82.8	-78.8	-76.4	-73.3	-70.3	-66.9	-63.4
25	-88.1	-85.1	-82.0	-78.0	-75.4	-72.3	-69.3	-65.9	-62.4
28/30	-87.3	-84.1	-81.1	-77.1	-74.7	-71.6	-68.6	-65.2	-61.7
40	-86.0	-82.8	-79.8	-75.8	-73.4	-70.3	-67.3	-63.9	-60.4
50	-85.1	-81.8	-78.9	-74.9	-72.5	-69.4	-66.4	-63.0	-59.5
55/56/60	-84.5	-80.3	-78.3	-74.3	-71.9	-68.8	-65.8	-62.4	-58.9

Receive Sensitivity In dBm (28-42 GHz)

Channel Width (MHz)	QPSK	8PSK	16 QAM	32 QAM	64 QAM	128 QAM	256 QAM	512 QAM	1024 QAM
3.5	-93.6	-90.6	-87.4	-83.4	-81.0	-77.9	-74.9	-71.4	-67.9
3.75	-93.4	-90.1	87.2	-83.2	-80.8	-77.7	-74.7	-71.2	-67.7
5	-91.4	-88.4	-85.8	-81.8	-79.1	-76.0	-73.0	-70.0	-66.6
7	-90.9	-87.9	-84.7	-80.7	-78.3	-75.2	-72.2	-68.4	-64.9
8.33	-89.7	-86.7	-83.5	-79.5	-77.3	-74.5	-71.4	-68.0	-64.4
10	-89.2	-86.2	-83.0	-79.0	-76.6	-73.5	-70.5	-67.1	-63.6
12.5	-88.3	-85.3	-82.4	-78.1	-75.7	-72.4	-69.4	-66.0	-62.5
14	-87.5	-84.5	-81.3	-77.3	-74.9	-71.8	-68.8	-65.4	-61.9
20	-86.0	-83.0	-79.8	-75.8	-73.4	-70.3	-67.3	-63.9	-60.4
25	-85.1	-82.0	-79.0	-75.0	-72.4	-69.3	-66.3	-62.9	-59.4
28/30	-84.4	-81.4	-78.1	-74.1	-71.7	-68.6	-65.6	-62.2	-58.7
40	-83.0	-80.0	-76.8	-72.8	-70.4	-67.3	-64.3	-60.9	-57.4
50	-82.1	-79.1	-75.9	-71.9	-69.5	-66.4	-63.4	-60.0	-56.5
55/56/80	-81.5	-78.5	-75.3	-71.3	-68.9	-65.8	-62.8	-59.4	-55.9

Capacity Range 1518-64 Byte Packets (Mbps)

Channel Width (MHz)	QPSK	8PSK	16 QAM	32 QAM	64 QAM	128 QAM	256 QAM	512 QAM	1024 QAM
3.5	5.5 - 8.7	8.4 - 13.2	11.3 - 17.8	13.9 - 22	17 - 26.8	19.9 - 31.4	22.7 - 35.8	25.6 - 40.4	27.8 - 43.9
3.75	6.0 - 9.5	9.1 - 14.4	12.2 - 19.3	15.1 - 23.8	18.4 - 29.1	21.6 - 34	24.7 - 38.9	27.8 - 43.8	30.2 - 47.5
5	8 - 12.7	12.1 - 19.1	16.2 - 25.6	20 - 31.6	24.5 - 38.6	28.6 - 45	32.7 - 51.5	36.8 - 58.0	40 - 63.0
7	10.5 - 16.6	15.5 - 24.9	21.2 - 33.4	26.2 - 41.2	31.9 - 50.3	37.3 - 58.7	42.6 - 67.8	48 - 75.6	52.1 - 82.1
8.33	13.5 - 21.4	20.4 - 32.1	27.3 - 43.1	33.7 - 53.1	41.1 - 64.7	48 - 75.6	54.8 - 86.4	61.7 - 97.3	67.1 - 105.6
10	15.7 - 24.7	23.6 - 37.1	31.6 - 49.8	38.9 - 61.3	47.5 - 74.8	55.5 - 87.4	63.4 - 99.9	71.4 - 112.4	77.5 - 122.1
12.5	20 - 32	30.6 - 48.3	41.1 - 64.7	50.6 - 79.7	61.7 - 97.2	72.1 - 113.5	80.4 - 129.7	92.7 - 146	100.7 - 158.6
14	23 - 36	34 - 54	46 - 73	57 - 90	69 - 109	81 - 128	93 - 146	104 - 165	113 - 179
20	33 - 52	49 - 78	66 - 105	82 - 129	100 - 147	116 - 184	133 - 210	150 - 236	163 - 257
25	41 - 65	62 - 97	83 - 130	102 - 161	124 - 196	145 - 229	166 - 262	187 - 295	203 - 320
28/30	49 - 77	74 - 116	99 - 156	122 - 196	148 - 234	173 - 273	198 - 312	223 - 351	242 - 382
40	66 - 104	99 - 157	133 - 210	164 - 258	200 - 315	234 - 368	267 - 420	300 - 473	326 - 514
50	78 - 119	122 - 189	164 - 258	202 - 318	246 - 387	287 - 452	328 - 517	369 - 582	401 - 632
55/56	98 - 155	148 - 233	198 - 312	244 - 384	297 - 469	347 - 547	397 - 625	447 - 704	486 - 761

* The numbers shown above are for full duplex. Aggregate capacities are double. Throughput measured with IPv4 layer 2 plus a single VLAN tag. Max capacity over 750 Mbps with IPv6.

ETSI System T/R Spacings

6 GHz	7 GHz	8 GHz	11 GHz	13 GHz	15 GHz	
240, 252.04, 340	154, 160, 161, 168, 196, 245	119, 126, 151.614, 208, 266, 311.32	490, 500, 530	266	315, 420, 475, 490, 640, 644, 728	
18 GHz	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz	42 GHz
1010	1008, 1232	800, 1008	1008	812	700, 1260	1500

Max Tx Power by Frequency (dBm)

Mod	6, 7, 8 GHz	10 GHz	11 GHz	13, 15 GHz	18-26 GHz	28-40 GHz	42 GHz
QPSK	30	26.5	28	26	25	25	23
8PSK	30	26.5	28	26	25	25	23
16QAM	28	22.5	26	24	23	22	20
32QAM	28	22.5	26	24	23	22	20
64QAM	25	20.5	25	20	22	21	17
128QAM	25	20.5	25	20	22	21	17
256QAM	23	18.5	23	18	20	17	15
512QAM	23	18.5	23	18	20	17	15
1024QAM	23	18.5	22	18	19	17	15

ANSI System T/R Spacings

6 GHz	7 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	38 GHz
160, 170, 252.04, 340	150	490, 500	225	475, 640	1560	1200, 1232	700

* The numbers shown above are for full duplex. Aggregate capacities are double. Throughput measured with IPv4 layer 2 plus a single VLAN tag. Max capacity over 750 Mbps with IPv6.



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