



Product Presentation Transcend 800

2013



**Native TDM, Ethernet and video traffic
Up to 2xSTM-1/OC-3 + 16 E1/T1 + 7 GigE per radio**

Brief Technical Facts:

- ❖ 400 Mbps max modem throughput
- ❖ Modulation up to 256QAM
- ❖ Native IP, TDM and video traffic
- ❖ Errorless ACM
- ❖ Advanced Viterbi/RS/LDPC coding
- ❖ Diversified interfaces
- ❖ TDM Mux A/D capabilities

- ❖ Full redundancy with hitless switching
- ❖ Gigabit Switch/Router built in
- ❖ Open platform for future XPIC application
- ❖ Minimal latency added
- ❖ In-band and out-of-band remote management
- ❖ High speed interface for protection and traffic aggregation



Advantech
Wireless

Transcend 800 B

Option for Broadcast applications

DVB-ASI integrated within the platform

Connects directly with broadcast equipment

MPEG data can be transmitted without encapsulation as native traffic.

Option to carry 10 MHz clock and has 1pps sync





Supported Frequency Bands

- 6 GHz: 5.9 to 7.1
- 7 GHz: 7 to 7.9
- 8 GHz: 7.9 to 8.5
- 10 GHz: 10.15 to 10.65
- 11 GHz: 10.7 to 11.7
- 13 GHz: 12.7 to 13.3
- 15 GHz: 14.4 to 15.4
- 18 GHz: 17.7 to 19.7
- 23 GHz: 21.2 to 23.6
- 26 GHz: 24.2 to 26.5
- 28 GHz: 27.5 to 29.5
- 32 GHz: 31.8 to 33.4
- 38 GHz: 37.0 to 40.0

Note: RF Bands 6 - 11 GHz are available as split type solution (with ODU) and as All-Indoor solution with high power RFU.



The same mechanical solution for all radios and RF bands with 4 ODU types:

LP (low power)

SP (standard) power

HP (high) power

EP (enhanced) power

Standardized Antenna Interface



RF Band	T to R (MHz)
6 GHz	240, 252, 340
7 GHz	154, 160, 161, 168, 196, 245
8 GHz	119/126, 266, 311.32
11 GHz	490, 500, 530
13 GHz	266
15 GHz	315/322, 420, 490, 640, 728
18 GHz	1008/1010, 1560
23 GHz	1008, 1200, 1232
26 GHz	800, 1008
32 GHz	812
38 GHz	700, 1260



Easy and safe ODU installations:

- Compact & lightweight
- Extremely easy replacement of ODU
- Polarization changed by simple rotation of RFU
- Compliant to ETSI environment standard ETS 300 019-1-4
- Standard ODU type for all radios opens easy and seamless path to future system expansion
- Over 70 years MTBF based on field return data





ODU Output Power Specifications

Frequency Band (GHz)	6	7/8	11	13	15	18	23	26	28	32	38
Low Power (LP):											
QPSK / 8PSK	-	27	25	25	23	23	23	22		21	18
16 QAM / 32 QAM	-	22	21	21	21	21	20	19		18	16
64 QAM / 128 QAM / 256 QAM	-	-	-	-	-	-	-	-	-	-	-
Standard Power (SP):											
QPSK / 8PSK	-	27	26	26	26	25.5	24	23.5		22.5	22
16 QAM / 32 QAM	-	22.5	21.5	21.5	21.5	21.5	21	20.5		18.5	17.5
64 QAM / 128 QAM / 256 QAM	-	16.5	15.5	15.5	15.5	15.5	14.5	13.5		12.5	11.5
High Power (HP):											
QPSK / 8PSK	30	30	28	26	26	25.5	25	25	25	23	23
16 QAM / 32 QAM	28	28	26	23	23	22	22	22	22	21	20
64 QAM / 128 QAM / 256 QAM	24	24	21	18	18	17	17	17	17	16	16
Enhanced Power (EP):											
128 QAM	28	27	-	-	-	-	-	-	-	-	-





Applications

- All-Indoor mw radio solution
- Long haul SONET and/or IP/Ethernet microwave transport
- High capacity backbone routes
- Trunking networks
- Public safety, utility, private network and enterprise connectivity
- 1+N protection with capacity aggregation

4+0 RFU configuration





Transcend 800 RFU (Cont)



- The **All-Indoor RF Unit** has been developed for long haul, high capacity microwave transport applications, where high performance and high RF performance are required.
- The All-Indoor RFU is comprised of a compact, flexible chassis, which houses one or two Transceiver Modules as well as a Filter Branching Network. The complete system can be configured to support 1+0, 1+1 Hot Standby, Space Diversity or a variety of other system architectures;
- Space Diversity Dual Port Receivers with digital IF combiner are available



Modulation	High Power (dBm)			Very High Power (dBm)			
	L6 & U6	7 & 8	11	L6 & U6	7	8	11
256 QAM	29.5	29.0	26.5	32.5	32.5	31.5	31.5
128 QAM	30.5	30.0	27.5	33.5	33.5	32.5	32.5
64 QAM	31.5	31.0	28.5	34.0	34.0	33.0.	33.0
32 QAM	32.5	32.0	29.5	34.5	34.5	34.0	34.0
16 QAM	33.5	33.0	30.5	35.0	35.0	34.5	34.5
QPSK	34.5	34.0	31.5	35.5	35.5	35.0	35.0

(*) Measured at antenna branching port





Typical Throughput

Modulation	QPSK	8PSK	16QAM	32QAM	64QAM	128QAM	256QAM
Code Rate	10/11	5/6	10/11	7/8	10/11	10/11	10/11
RF Bandwidth (MHz)	Typical Throughput (Mbps)						
1.75	2.7	3.7	5.5	6.6	8.3	9.7	11.1
2.5	3.9	5.4	7.9	9.5	11.9	13.9	15.9
3.5	5.5	7.6	11.1	13.3	16.7	19.5	22.3
3.75	5.9	8.1	11.9	14.3	17.9	20.9	23.9
5	7.9	10.9	15.9	19.1	23.9	27.9	31.9
7	11.1	15.3	22.3	26.8	33.5	39.1	44.7
10	15.9	21.9	31.9	38.4	47.9	55.9	64.0
14	22.3	30.7	44.7	53.8	67.2	78.4	89.6
20	31.9	43.9	63.9	76.9	96.0	112.0	128.1
25	39.9	55.0	80.0	96.2	120.0	140.1	160.1
28	44.8	61.6	89.6	107.8	134.5	156.9	179.3
30	48.0	66.0	96.0	115.5	144.1	168.1	192.2
40	64.0	88.0	128.0	154.0	192.1	224.2	256.3
50	80.0	110.1	160.1	192.6	240.2	280.3	320.4
56	88.9	122.2	177.7	213.8	269.2	314.1	359.0
80	88.9	122.2	177.7	213.8	269.2	314.1	359.0

- Higher throughput can be achieved with higher code-rates and smaller roll-off factors
- T800 provides flat throughput, regardless of the packet size





Typical Receive Thresholds

30 MHz	Coding & Modulation Schemes							
Modulation	QPSK	8PSK	16QAM	32QAM	64QAM	128QAM	256QAM	256QAM
Code Rate	3/4	3/4	3/4	3/4	5/6	6/7	7/8	19/20
Maximum Data throughput (Mbps)	39.7	59.6	79.5	99.3	132.1	158.5	185.0	200.0
L6 GHz Threshold (10 ⁻⁶ BER) (dBm)	-88.3	-84.5	-82.9	-79.4	-76.3	-73.4	-70.2	-69.0

Better thresholds can be achieved with lower code-rates and higher roll-off factors



- T800 uses LDPC (Low Density Parity Check) FEC to achieve the market's best receive thresholds :
 - 4dB to 5dB noise threshold improvement vs existing radios on the market
 - Performance 0.8 dB off the theoretical Shannon limit
- Better system gain :
 - smaller antenna, lower mast installation cost
 - longer hop, fewer links required
 - higher link availability, less down time



Typical Hop Distance

Frequency Band	Modulation	Antenna Size		
		0.6 m	1.2 m	1.8 m
7 GHz	QPSK	47 Km	82 Km	> 100 Km
7 GHz	16QAM	34 Km	59 Km	83 Km
7 GHz	256QAM	16 Km	28 Km	39 Km
18 GHz	QPSK	23 Km	33 Km	40 Km
18 GHz	16QAM	17 Km	25 Km	30 Km
18 GHz	256QAM	11 Km	16 Km	20 Km

- Hop distance was calculated based on rain zone E (22 mm/h), continental temperature climates or mid-latitude inland climatic regions with average rolling terrain, terrain factor 22 m.
- Link Availability target = 99.999%, Channel bandwidth = 28 MHz.
- If availability of 99.996% is acceptable, antenna size can be reduced.





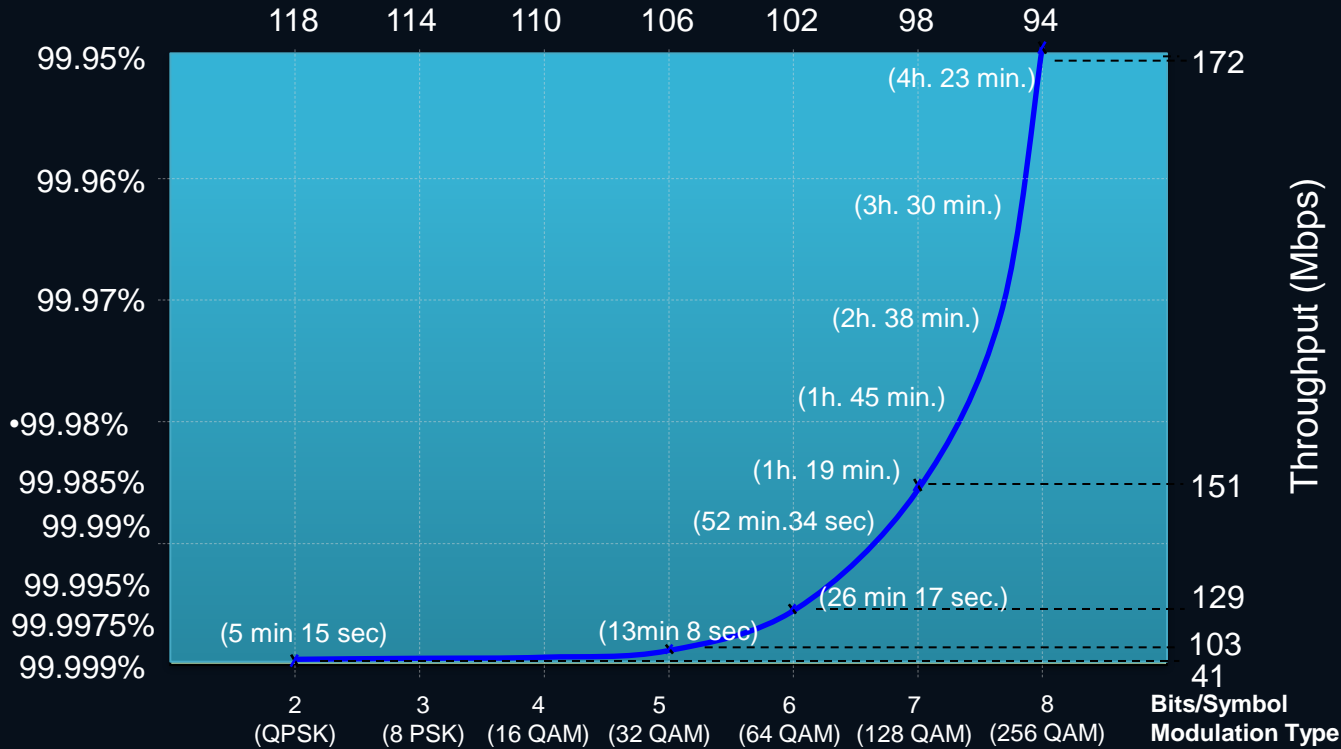
Adaptive Coding & Modulation (True ACM™)

- T800's ACM gradually adapts modulation and coding to combat fading, gaining up to 20 dB in receive threshold.
- If T800 networks are designed with 99.999% using 256QAM, having ACM switches down to QPSK would improve availability to near 100%. Alternatively, we can design with 99.996% using 256QAM to save on antenna size.
- Multiple modulations & multiple code-rates make up 16 ACM switching levels in the T800. Competitors' AM (Adaptive Modulation) only has 7 or 8 switching levels. Fewer ACM levels = more throughput losses and less fine adjustments between adjacent levels.
- All Transcend 800 ACM switching is hitless.
- As ACM switches to lower modulations, less throughput will be available on the link. Therefore, priority will be given to mission critical data such as VOIP to go through first.



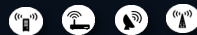
System Gain (dB)

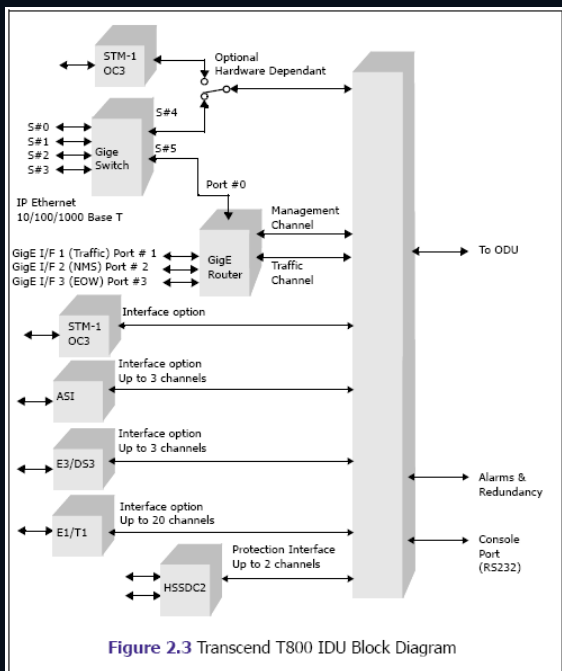
Annual Availability (In brackets)
Annual Non-Availability in sec
for the given Modcode



FACTS:

- 256QAM carries 172 Mbps of throughput; 128QAM = 151 Mbps; 32QAM = 103 Mbps; QPSK = 41 Mbps
- Without ACM, 172 Mbps requires 2.4m antenna to achieve 99.995% (or 26 min 17 sec/year total outage)
- With ACM, only requires 1.2m antenna, 99.95% of the year carries 172 Mbps. Only 4h 23min/year operates under 172 Mbps. Only 13min 8 sec/year operates under 103Mbps. Only 5min 15sec/year total outage.
- “Improved System Gain” by 24 dB: trading the throughput for availability



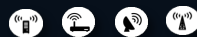
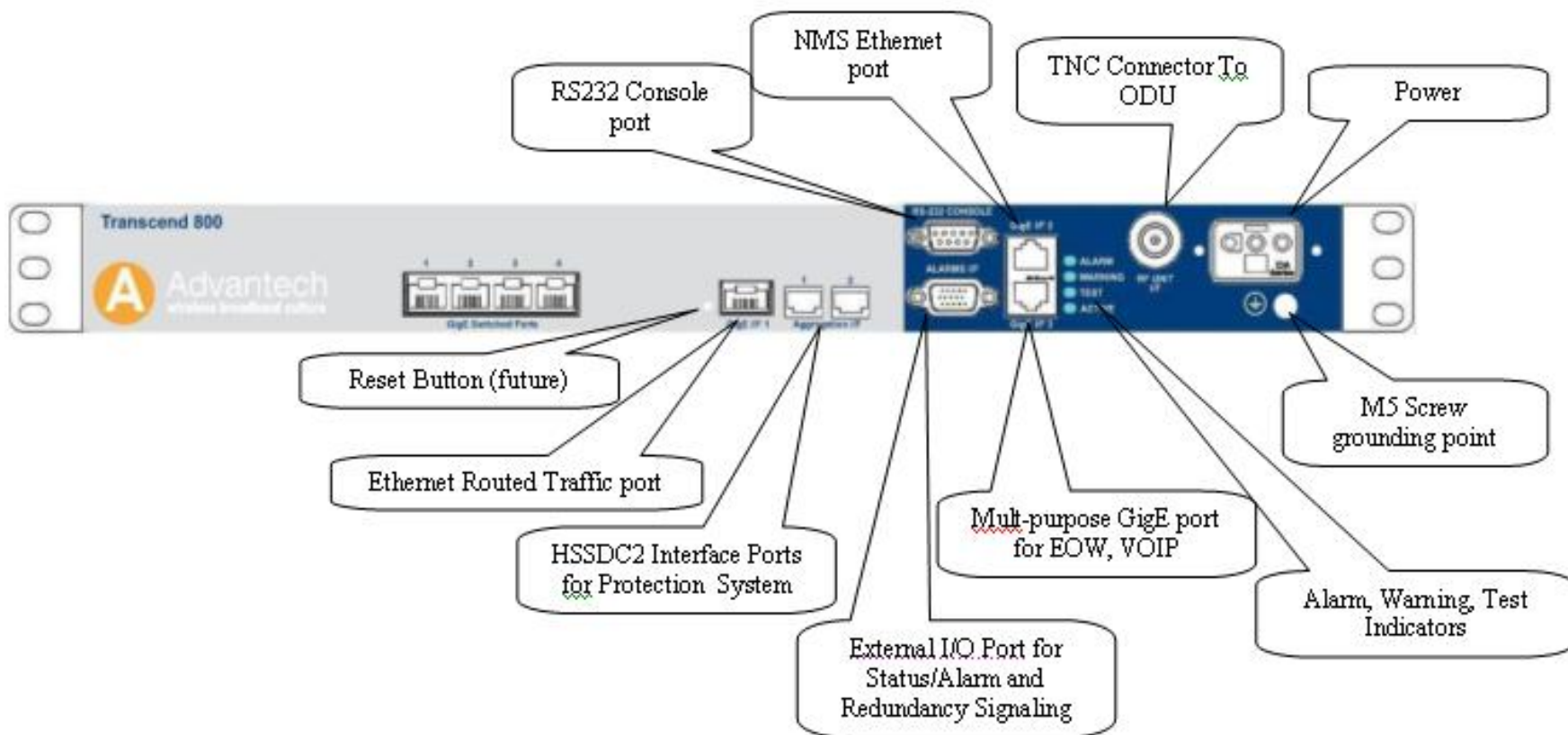


- The figure shows the IDU and interfaces from a functional point of view.
- The functional partitions for the I/O, Modem/IF, Controller and power supply modules are shown. The IDU comes with the standard I/O capability, which can be upgraded with optional interfaces.



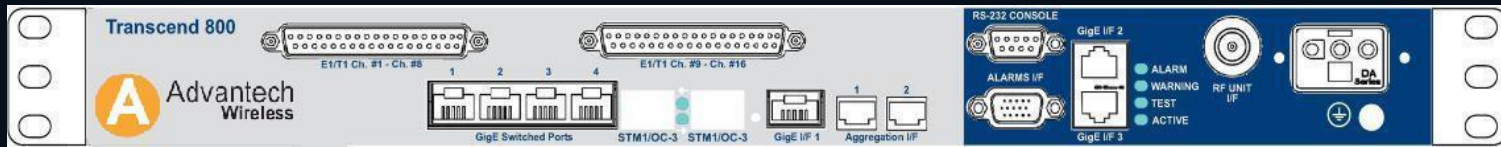


T-800 Common Interfaces



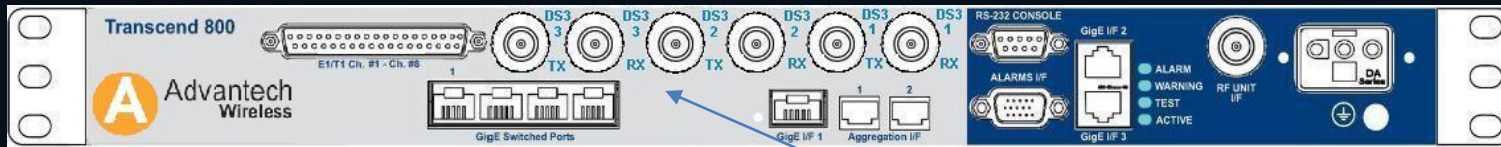


T 800 Traffic interface diversity



1000 base SX fiber on SFP

2xSTM-1 on SFP



DS-3/E3 interface



2xASI 1 interface

() This is example only. Multiple combinations are possible.*





Native IP traffic - Low Ethernet Latency

T800 has sub-milliseconds latency to ensure seamless delay in mobile backhaul and private networks

When transmitting at 350 Mbps

- Latency for 64-byte packets = 200 usec
- Latency for 1518-byte packets = 270 usec

The industry standard is asking for 400 usec

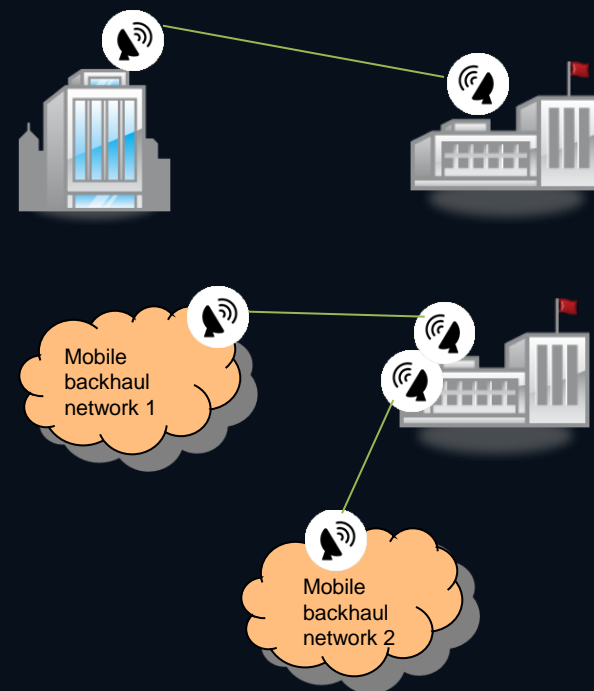


T-800 Built-in Router

- Unique zero-footprint solution
 - Router with a built-in RF WAN port
 - All indoor – much higher MTBF
- Gigabit router with ultra high performance and capacity
- High packet throughput
 - Ruler-flat performance for up to 3Gbps or 200Kpps limit
 - Throughput independent from packet size



- When interconnecting multiple private WANs or multiple backhaul networks, use T800 router features and eliminate the need to purchase a Cisco router on each end.
- Basic router features are:
 - IP routing: static, dynamic (RIP v.1, v.2, OSPF v.2)
 - Packets filtering (firewall), access lists up to network layer 4
 - IP tunneling (IP over IP, GRE)
 - Static multicast forwarding
 - Policy based routing
 - Load balancing
 - UDP broadcasts forwarding (DHCP, DNS, BOOTP, etc.)
 - QoS network layer 3 :
 - FIFO queue (FIFOQ)
 - Priority queuing (PRIQ)
 - Class based queuing (CBQ)
 - Waited Fair Queue (WFQ)
 - Configurable IP policy
 - ICMP policy
 - Routing policy
 - Switching policy
 - TCP policy
 - UDP policy
 - IPSec

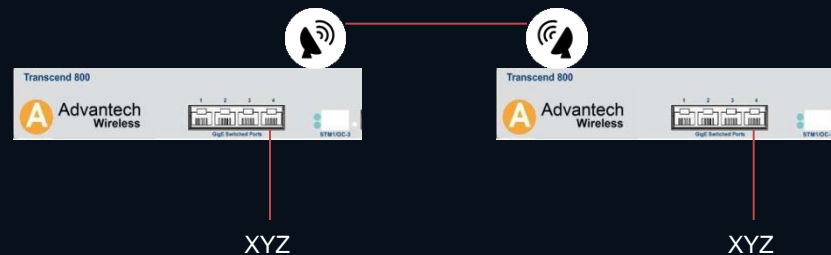




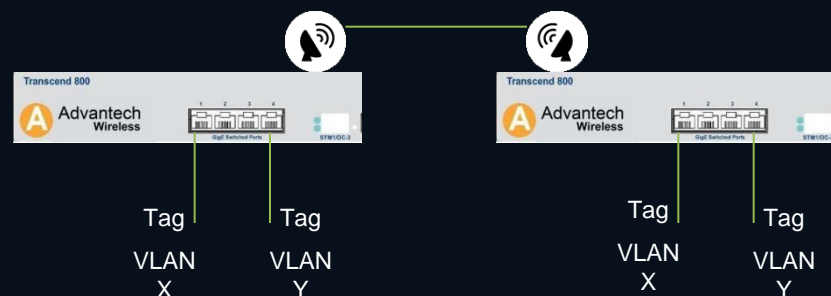
T800 can provide transparent IP connectivity, or

Individually set each GigE switched port for

- Duplexing/speed
- VLAN tagging and VLAN filtering
- QoS by priority tagging or DiffServ
- Rate limit



“Transparent IP connectivity”



“Individual IP port settings”





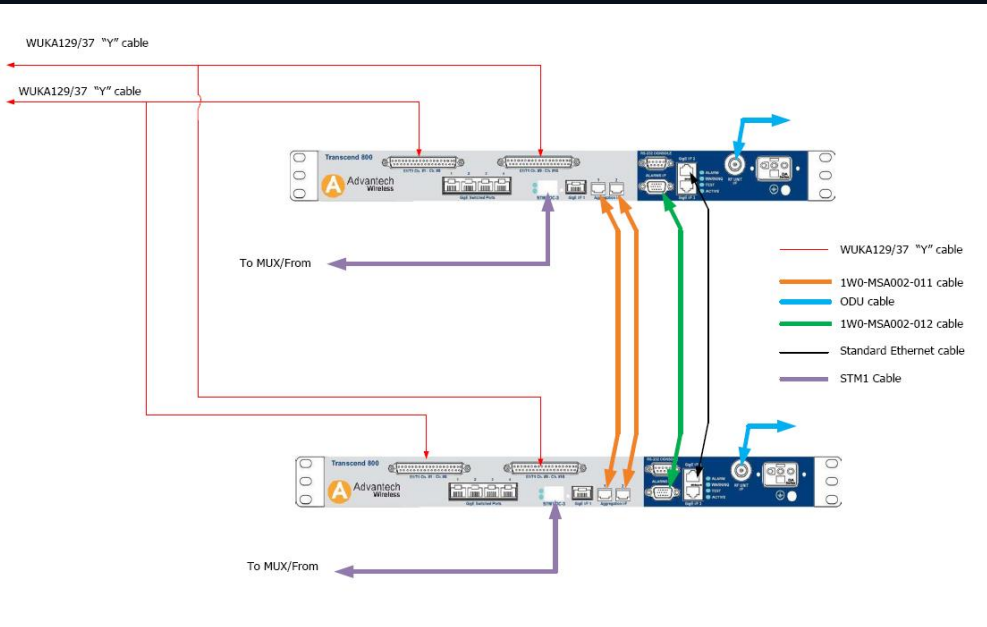
T-800B Version with ASI interface for TV broadcast market

- Transcend™ 800 carries MPEG data carried directly from broadcast equipment through integrated DVB-ASI interfaces over the microwave link. The DVB-ASI interfaces support standard definition, high definition, and Digital 3D broadcast applications. With the built-in 10MHz clock, broadcast network can carry a high stability Stratum 2 clock to each site and avoid installing the costly GPS equipment.
- Up to 8xASI interface full duplex
- Simultaneous native IP and TDM traffic
- 214 Mbps per ASI max with 188-byte & 204-byte packets



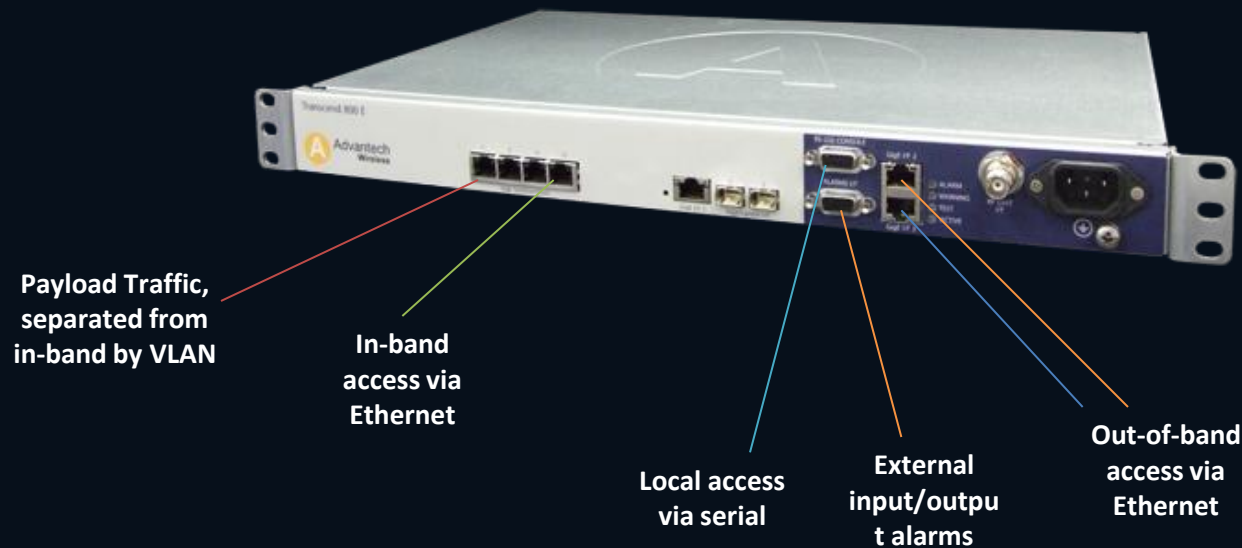
Redundancy Configuration

- Protection against hardware failure and propagation effects
- No single hardware point of failure concept
- Optional dual power supply option
- Transmitter Hot Standby
- Diversity operation using hitless switching
- Space Diversity, Frequency Diversity, Polarization Diversity
- N+0 Link Aggregation
- Easy system expansions and reconfigurations





- Command Line Interface (CLI) via serial or telnet session
- Web interface, SNMP interface via Ethernet
- User account management via local AAA, RADIUS, TACACS+
- System Log



T-800 Version with only IP interface is shown





CLI commands are very similar to Cisco commands, making it easier for IT personnel.

```
8_100#show running
Building configuration...
Current configuration : 1156 bytes
-----
! integrity, hash(md5, sr+zdFG65sC1R5w92ZG0+Q==);
! Generated by 8_100 on 2011-03-14 18:16:50
alarm odu not-present ignore
no alarm odu undercurrent action log
alarm odu undercurrent ignore

no dns use-cache
dns order hosts-then-bind
ip domain-lookup
ip name-server 192.168.1.14
ip domain-name localdomain
hostname 8_100
ip host localhost 127.0.0.1

no service timestamps debug
no service timestamps log
logging console informational

ip route 0.0.0.0/0 192.168.8.1

bridge 1
bridge 1 protocol spanning-tree-enabled

ntp client
ntp server 132.246.11.230

ip http server

no device odu tx-mute
device odu threshold rsl-pre-alarm -69
device odu frequency 8171000 7905000

device modem SB8088 0
    profile E-28MHz-16K-0.75-ACM8-16E1-Eth
    level 4

interface BV11
    ip address 10.0.0.2 255.0.0.0
    mac-address 00:01:02:03:04:10
    no shutdown

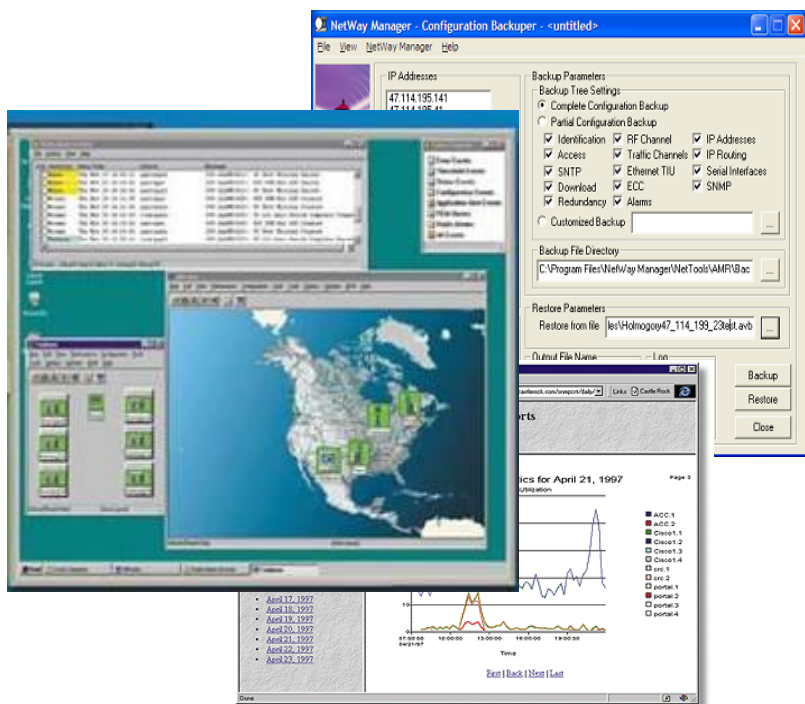
interface Ethernet2
    bridge-group 1
    ip address 192.168.8.101 255.255.255.0
    no shutdown
```

```
8_100#configure terminal
8_100(config)#int
8_100(config)#interface ether
8_100(config)#interface Ethernet 2
8_100(config-if)#?
  access-expression      Build a bridge boolean access expression
  bandwidth              Set bandwidth informational parameter
  bridge-group           Transparent bridging interface parameters
  cdp                    CDP configuration subcommands
  description            Interface specific description
  encapsulation          Set encapsulation type for an interface
  end                    Exit from interface configuration mode
  exit                  Exit from interface configuration mode
  help                  Description of the interactive help system
  ip                    Interface Internet Protocol config commands
  loopback              Configure loopback on an interface
  mac-address            Manually set interface MAC address
  mtu                   Set Maximum Transmission Unit
  no                    Negate a command or set its defaults
  proxy-arp             Enable ARP proxying
  queue-size            Set output queue size (no ALTO)
  rate-measurement      Interface rate measurement parameters configuration
  shutdown              Shutdown the selected interface
  tagging               Set maximum number of packets in transmit FIFO
  transmit-packets
8_100(config-if)#ip
8_100(config-if)#ip ?
  accept-source-routing  Accept source-routed packets
  access-group           Specify access control for packets
  address                Set the IP address of an interface
  bmcst-echo            Answer to broadcast/multicast echo requests
  directed-broadcast     Enable forwarding of directed broadcasts
  firewall              Local firewall settings
  forward-to-the-same-net Enable forwarding to the same subnet
  helper-address        Specify a destination address for UDP broadcasts
  mask-reply            Answer to network mask query
  nat                   Network Address Translation
  ospf                  OSPF interface commands
  redirects             Enable sending redirects
  rip                   Router Information Protocol
  route-map             Policy route map
  routing              Enable routing for packets from this interface
  set-input             Redirect input on the another interface
  source-route          Enable sourcerouting
  split-horizon         Perform split horizon
  switching             Enable switching for packets from this interface
  tcp                  TCP configuration
  udp                  UDP configuration
  unnumbered            Interface to import settings from
  unreachable           Enable sending unreach messages
  --More--
```





Highlights



- Netway Manager™ (NWM) consistent management tool for Advantech Wireless Transcend radios
- Secure distributed network management system that will monitor entire network infrastructure
- NWM can manage third party equipment including radios
- For large networks: supports integration into higher-level NMS
- For smaller networks: standalone NMS
- Two network size variants: Telecom and Enterprise





Key Benefits

- NetWay Manager™ uses a distributed architecture and scales to manage any size of network
- Distributed polling architecture makes it easy to manage networks that span multiple sites
- Collects long term network statistics and automatically generates custom Trend Reports
- Quickly and easily create installation files
- Secure network management through support of SNMP v3
- NetWay Manager™ is extremely easy to deploy and use
- Capable to manage other supplier radios and different telecom equipment



The Power behind Content

Thank you!

For more information please visit us at
www.advantechwireless.com