Overview

MRV is the leader of Free Space Optics (FSO or Optical Wireless) by means of its TereScope® product line, an optical wireless system for data, voice and video transmission system. The MRV TereScope® systems provide the most comprehensive FSO wireless solutions, ranging from short to long distances and narrow to ultra-high bandwidth.

TereScope® provides ultra high bandwidth using a technology similar to that found in fiber optics communications, providing full-wire data rate using optical signals. In addition, the narrow and invisible laser beam makes it the most secure wireless solution, nearly impossible to intercept. TereScope systems, without the need for right-of-way or government permits for installation, provide a license-free technology.

TereScope® Series

The Most Comprehensive
Free Space Optics Wireless Solution

Providing high-speed fiber-speed with wireless flexibility

The TereScope® family of Free-Space Optics (FSO) products provides cost-effective, high-speed wireless connectivity for a variety of applications, such as: Enterprise connectivity, Voice & Data, Video and Entertainment, Telco Bypass, Disaster Recovery, Surveillance and Government, Backhaul for wireless mesh.
Whether you need narrowband voice and/or broadband data, our products provide scalable, wireless solutions at fiber-speed.
Operating at data rates of 1.5 Mbps to 1.25 Gigabit speeds, TereScope® systems' deployment is fast, without requiring right-of-way or government permits for installation, providing you with flexible high bandwidth, secure communication.
Whether you are a Service Provider or an Enterprise customer, the TereScope® family of products can provide you with the data rate, performance and reliability that you need in a communications network.

The Free Space Optics Advantage

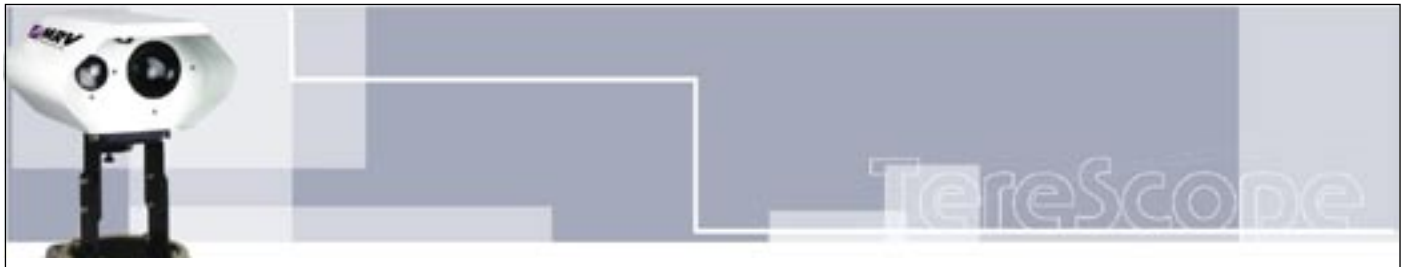
Ultra High Wireless Bandwidth
The components used in FSO technology are similar to those found in fiber optic system. Therefore, FSO gives you the high data rates previously provided only by fiber optics.

Most Secure Wireless Transmission
The beam that transmits your data is very narrow and invisible, making it nearly impossible to intercept.

License free operation No need to obtain frequency licenses for the operators of TereScope® FSO wireless solutions

MRV

www.mrv.com **Contact: sales@mrv.com**



Versatile Protocol Compatible for better investment protection FSO links work with a variety of protocols. Protocols such as Ethernet, Fast Ethernet, Gigabit Ethernet, FDDI, ATM, and ESCON can all be transmitted through TereScope® without issue. Using an industry standard network interfaces and a clear upgrade path for higher bandwidth protects your investment in MRV TereScope® solutions.

Safe to Use All TereScope® systems are eye and skin safe at the aperture and meet all the safety standards – including the IEC60825-1 Class 1M standard.

Major Cost Savings With TereScope links, you own your bandwidth. Avoiding the recurring costs of leased lines and licensing costs, your return on investment can be realized in just a few months

MRV's TereScope® - Free Space Optics (FSO) solutions

Integrated End-to-End solution

Backed by over twenty years of research and development in the field of Free Space Optics and networking, MRV is the market leader in FSO technology. We have over 7000 links deployed worldwide granting us more experience in selling, installing and servicing this equipment than any other FSO vendor. In addition to incorporating all of the FSO advantages, our TereScope® systems offer unique integration of end-to-end networking solution (using MRV Ethernet solutions) and patented features including:

- Multiple transmitters to reduce scintillation, based on matrix transmission
- All-optics FSO - TereScope 1 (PAL) systems are all-optical, free of electronics and do not require any power source to provide optical wireless solutions
- An RF backup system (Fusion) for a number of the TereScope products, offering carrier-class availability (99.999%) in all types of weather, including heavy fog and rain
- End-to-End Management by MegaVision®, MRV's SNMP manager, or any commercially available SNMP browser

Performance – Ultra High Bandwidth

The high-end TereScope® series provides for 1 Mbps to 1.25 Gbps wire-speed connectivity for distances of up to 6.7 km.

Reliable Communication

Multiple transmit apertures technology: The TereScope® products use a multiple transmit apertures technology to ensure high performance under adverse weather conditions. The receivers are designed to overcome scintillation and other atmospheric noises in hot or cold weather.

High MTBF: All TereScope® systems are extremely reliable with an MTBF (Mean Time Between Failures) of more than 10 years.

Heating: All our midrange systems are equipped with our special internal air circulation feature, based on dissipation of the power supply heat. This prevents the formation of condensation on the lenses under all weather conditions without the need for additional heating at low temperatures

- For the TS5000 and TS4000 models, an optional front window with the heating system can be ordered separately (p/n TSX000-HEAT for a link). We recommend this solution only for extremely adverse weather conditions such as heavy snow with strong wind or high humidity. For further info please consult your MRV representative.

Ethernet *Gigabit Ethernet* *OC3/STM-1*
4E1/4T1 *Fast Ethernet* *OC1*
E1/T1 *SMPTE* *STM-4*
ATM

secure optical wireless

TereScope® - The Most Comprehensive Free Space Optics Wireless solution

FSO Chaining for non-line-offset and higher distance communications The chaining of TereScope® FSO is required when the two sites are connected by more than one link using at least one additional building as a mid-point.

When is the Chaining required?
The chaining of TereScope® links is required in the following cases:

a) When there is no direct line of sight between the sites;
b) When the distance between the sites is too long;
c) When the distance between the sites is reachable with one link but the customer wants much more Power Budget for a higher reliability.

Backup Radio: Maximizing link availability under all weather conditions

The TereScope® Fusion was designed to combine the best features of two transport media: laser light and radio waves, to form a single, seamless, wireless communication link between network devices. By leveraging both technologies, we can provide the 99.999% availability that your network requires.
The TereScope® Fusion has been specifically constructed to maximize link availability between network nodes. These systems use the internationally unlicensed 2.4 GHz ISM band and are used as a backup for a number of TereScope systems.
TereScope Fusion systems have an optical wireless link that provides Fast Ethernet connectivity as the primary link and Ethernet RF as the backup link. These systems operate under most weather conditions, including heavy rain, snow and fog, to nearly 100% link availability. Ease of installation and freedom from licensing make these systems very simple to deploy.
The Fusion built-in option exists for the TS5000, TS4000 and TS800 series. Add-on Fusion exist for the other models.

Safety

All TereScope® models are eye and skin safe at the aperture and comply with eye safety Class 1M.

Network Management

SNMP Management: TereScope® is fully managed by using the SNMP option. SNMP monitoring can be done via MegaVision Web®, MRV's SNMP Element Management web-based system or any other SNMP browser.

Dry Contacts: The TereScope® systems can be equipped with a dry contact option that enables interfacing to dry contacts based local and remote management and monitoring systems.

End-to-End Networking

The unique integration of high bandwidth with most secure FSO technology and end-to-end Ethernet/IP switches and routers enables the deployment of multi-site connectivity with **in-building OptiSwitch Ethernet** solutions and outdoor **TereScope wireless** connectivity with **end-to-end MegaVision®** Pro NMS integrated **management.**

Data Rate / Distances	Model	LOW	Medium	Medium+	Long	Long+
2.048/1.55 Mbps	E1/T1	TS702	TS707	TS2000	TS4000	
4x2.048 / 4x1.55 Mbps	4E1/4T1	TS702	TS707	TS2000	TS4000	TS5000
10Mbps (ethernet)	ETH	TS702	TS707		TS4000	TS5000
1-34Mbps open protocol	34			TS4000	TS4000	
100Mbps (fast-Ethernet) 1-155Mbps	100/155	TS700 / TS1*	TS800	TS4000	TS5000	TS5000
1.25Gbps	G	TS700 / TS1000P**	TS5000	TS5000		

(*) TS1 - with 100BaseT interface only
TS700/155 - up to 155 Mbps
TS700/100 - with 100BaseT interface only
(**) TS700/G & TS1000P support GE only

TereScope - One versatile technology for a full complement of communication solutions

Features:

- Alignment using both visual feedback and received power indicators
- Fast deployment
- License-free operation
- Remote management options
- Weatherproofing: IP66
- Secure transmission
- Eyes safety Class 1M
- Chain multiple connections

Applications:

- Enterprise connectivity
- Mesh networking
- Voice & Video connections
- Video & Entertainment
- Carrier Bypass
- Surveillance
- Government
- Temporary installation
- Cross Border Links
- Healthcare
- Fiber Backup
- Business Continuity

TereScope® 5000 - up to GE

Going the farthest with modular design

The carrier class TereScope® 5000 provides long distance high-speed Free Space Optics (FSO) connectivity. Operating at data rates of 1 Mbps to 1 Gigabit, TereScope® 5000 systems are deployable rapidly, providing long distances FSO optical wireless connectivity.
The TS5000 exists in the following models: Ethernet, 4 x E1/T1, 155 and Giga
TereScope® 5000 uses multiple transmit aperture technology (3 transmitters) to ensure high performance in adverse weather conditions. The receiver of the long-range TereScope® 5000 has an 8" diameter to overcome scintillation and other atmospheric noises in hot or cold weather.

In addition to the formerly existing modular power supply, the improved model of TS5000 has another power supply, which noticeably improves the MTBF. When one of the power supplies breaks down, the other one continues to operate normally and transparently: the customer will only see on the back panel or on the MegaVision screen that one of the power supplies stopped working. The power supply modularity allows for replacing the faulty power supply without interrupting the normal operation of the link.

The TS5000 series also has a modular interface, i.e. the transceiver can be easily modified in the field from multimode to singlemode or from 850 mm to 1300 mm.
An additional advantage of the transceiver modularity is the possibility to add the Fusion option in the field in case this option has not been previously purchased.

Features

- Accommodates **1 Mbps to 1 Gigabit** networks, for protocols such as Ethernet, 4 x E1/T1, Fast Ethernet, ATM, Gigabit Ethernet. Storage
- Supports multiple protocols: E3/T3, Fast and Gigabit Ethernet, FDDI, OC-3, ATM and STM-1, Fiber Channel
- Distances up to 6.7 km
- SNMP Built-in
- Connection to dry contact management box (RSM-DC) – optional
- Connection to RSM box
- FUSION option – Fail-over to radio backup
- Modular network connectivity
- Modular Power Supply
- Redundant Power Supply - Optional

TereScope® - The Most Comprehensive Free Space Optics Wireless solution

TereScope® 5000 - Technical Specifications

MODEL/ PROD CODE			TS8/G/4E1/VS or TS8/G/4T1/VS TS5000/4E1 or TS5000/4T1	TS10/G/ETH/VS TS5000/ETH	TS155/G/XXX/VS or TS155/G/XXX/FS TS5000/155 or TS5000/155-F Standard model: TS155/G M3C/VS	TS1000/G/XYZ/V* TS5000/G Standard model TS1000/G/M8C/VS
Applications/ Data Protocol			4E1:4x2.048 Mbps or 4T1:4x1.55 Mbp G.703/G.704	Ethernet (10 Mbps)	Fast Ethernet, ATM, OC3, STM1, E3,T3, OC1/STM0 & Open Protocol	Gigabit Ethernet Escon, 622 Mbps, Fibre channel and others between 100 and1500 Mbps
Performance	Rate			10Mbps	1-155 Mbps	100-1500 Mbps
	Range[1] @ 3 dB/km		6700 m	6700 m	5200 m	3000 m
	@ 5 dB/km		5000 m	5000 m	4000 m	2500 m
	@10 dB/km		3200 m	3200 m	2540 m	1700 m
	@17 dB/km		2170 m	2170 m	1760 m	1220 m
	@30 dB/km		1400m	1400m	1150 m	820 m
	Minimum Range		400m	400m	600 m	500 m
	Bit error rate		Less than 1E - 9 (unfaded)	Less than 1E - 9 (unfaded)	Less than 1E - 12 (unfaded	Less than 1E - 12 (unfaded)
	MTBF		10 years			
Transmitter	Light source		3 x Lasers			
	Wavelength		830 - 860 nm			
	Total Output power		85 mW			120 mW
	Beam divergence		2 mrad			
Receiver	Detector		APD			
	Field of view		2 mrad			
	Sensitivity		-55 dBm	-55 dBm	-46 dBm	-33 dBm
Interface	Type		Electrical: E1:75 Ohm or 120 Ohm, T1: 100 Ohm	Copper 10 BaseT	Fiber Optic Transceiver - Multimode (Singlemode available upon request)	
	Connectors		Universal Connector	RJ45	SC (other connectors available)	
	Impedance		E1: 75 Ohm or 120 Ohm			
	Cable		Coax or STP	STP		
	Cable loss		Supports Short and Long haul trunks			
	Wavelength				1300 nm (other wavelength available)	850 nm (other wavelength available)
	Output power				-17 ± 3 dBm	-4 ± 9.5 dBm
	Receiver operating range				-14 to - 30 dBm	0 to - 17 dBm
Power Supplly	Voltage range		Factory set: 100-240 VAC @ 35/60 Hz or 35-60 VDC (V3)			
	Power consumption		22 W			
Environmental Information	Operating temperature		-30˚ C to +50˚ C			-30˚ C to +50˚ C
	Storage temperature		-50˚ C to +70˚ C			
	Humidity		95% non-condensing			
	Housing		Weatherproofing: IP66			
	Eye safety Class		1M			
Mechanical Design	Dimensions (mm		790 x 390 x 556 (AD-5000: 250x353x432)			
	Weight	Unit	18 kg			
		Accessories	20 kg			
Diagnostics	Indicators		Airlink: Flag, Sync E1 Ports: LED per port Receive Signal Strength (Digital Display) Laser status (3 LEDs)	Airlink: Flag, Data. 10 BaseT: Flag, Data Receive Signal Strength (Digital Display), Laser status (3 LEDs)	Airlink: Flag, Sync., Fiber Optic: Flag, Sync. Alignment, Loopback, Receive Signal Strength (Digital Display), Lasers status (3 LEDs)	Airlink: Flag, Sync., Fiber Optic: Flag, Sync.Alignment, Loopback, Fusion: Enabled/ Active, Heating status (if exists), Control mode: Hardware mode or softeware mode. Power supply status, Heating active, Receive Signal Strength (Digital Display), Lasers status (3 LEDs)
	Selectors		Termination, Electrical receive sensitivity, Line incoding LLB, RLB, IP address setting	IP address setting	Data Rate, Alignment, Loopback (local)	Alignment, Loopback (local), RLB, Laser status, Fusion activation, Heating activation (if exists), IP address setup, Control mode.
Management			SNMP Protocol - Built-in 6 Dry Contact ouputs: 4 for interface ports 1 for air-link flag 1 for air-link sync	SNMP Protocol - Built-in One pair of pins of the main RJ45 connector can be used for dry contacts purposes, for air link flag alarm	SNMP protocol - Built-in Two pairs of Pins of the management RJ45 connector can be used for dry contact purposes, for Airlink flag and F/O flag alarms	SNMP protocol - Built-in Two pairs of Pins of the management RJ45 connector can be used for dry contact purposes, for Airlink flag and F/O flag alarms
Standards Compliance	Jitter Specifications proposed for SONET/SDH equipment defined by the Bellcore Specifications: GR-253-CORE, Issue 2, December 1995 and ITU-T Recommendations: G.958 document. Typical Applications: OC-1, STS-3, ATM, FDDI, E3, Fast Ethernet etc... EN50081-1:1991; EN50082-1:1998; EN55022:1997; EN61000-4-2:1995; EN61000-4-3:1995; EN61000-4-4:1995; EN61000-4-5:1995; ENV50142; EN61000-4-6:1996/ENV50141; EN61000-4-8:1993; EN61000-4-11:1994; EN61000-3-2:1995; IEC950, 1991, A1, A2, A3, A4; EN60950, 1992, A1, A2, A3, A4, A11; FCC part 15 Class A; UL1950, 3rd Edition (1995); CSA22.2, No.950 (1995); weather proofing IP66					

[1] @ 3 dB/km = Light rain (5-10 mm/hr) - Light haze
@ 5 dB/km = Light to medium rain (15-20 mm/hr) - Haze
@10 dB/km = Medium to heavy rain (45 mm/hr) - Light snow - Thin fog
@17 dB/km = Cloudburst (100 mm/hr) - Medium snow - Light fog
@30 dB/km = Rain (up to 180 mm/hr) - Blizzard - Moderate fog

TereScope® 4000 - 1 to 155Mbps Solutions

Robustness is the key

The carrier class TereScope® 4000 operates at data rates of 1 Mbps to 155 Mbps, TereScope 4000 systems are used for medium distances and support a wide variety of protocols at full duplex at wire-speed. It can achieve distances of up to 5.2 km.

The TS4000 exists in all models but Gigabit as follows: E1/T1, 4 x E1/T1, Ethernet, 34 and 155.

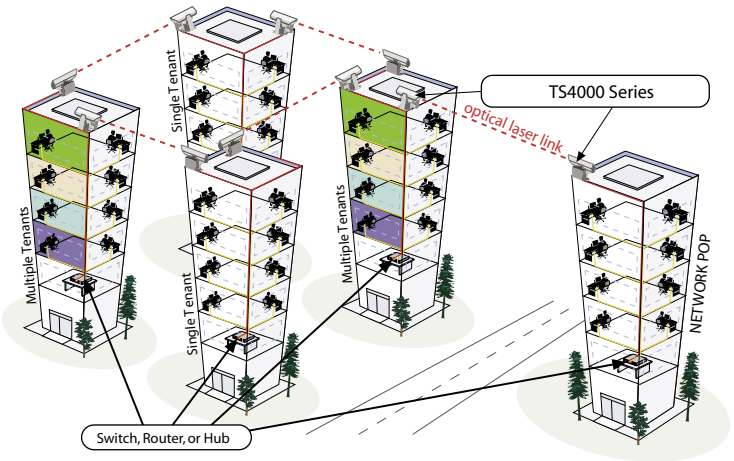
TereScope® 4000 uses multiple transmit aperture technology (3 transmitters) to ensure high performance in adverse weather conditions. The receiver of the long-range TereScope® 4000 has a diameter of 8" to overcome scintillation and other atmospheric noises in hot or cold weather.

Regarding functionality, the TS4000 has all the advantages of the TS5000, such as operation in Open Protocol mode, optional redundant power supply and modular interface.

Features

- Accommodates **1 to 155 Mbps** networks, for protocols such as E1/T1, Ethernet, 4xE1/T1, 34Mbps, Fast Ethernet, ATM
- Supports protocols: E1/T1, E3/T3, 4 x E1/T1, Ethernet, Fast Ethernet, FDDI, OC-3, ATM and STM-1
- Distances up to 5.2 km
- Built-in SNMP management
- Connection to dry contact management box (RSM-DC) – optional
- Connection to RSM box

FUSION option – Fail-over to radio backup
Modular network connectivity
Modular Power Supply
Redundant Power Supply - Optional



TereScope® - The Most Comprehensive Free Space Optics Wireless solution

TereScope® 4000 - Technical Specifications

MODEL/ PROD CODE		TS2/E2/E1/VS or TS2/E2/T1/VS TS4000/E1 or TS4000/T1	TS8/E2/4E1/VS or TS8/E2/4T1/VS TS4000/4E1 or TS4000/4T1	TS10/E2/ETH/VS TS4000/ETH	TS34/E2/XYZ/V* TS4000/34	TS155/E2/XXX/V* or TS155/E2XXX/F* TS4000/155 or TS4000/155-F
Applications/ Data Protocol		E1: 2.048 Mbps or T1:1.55Mbps G.703/G.704	4E1:4x2.048 Mbps or 4T1:4x1.55 Mbps G.703/G.704	Ethernet	Open Protocol, F/O	Fast Ethernet, ATM, OC3, STM1, E3,T3, OC1/STMO & Open Protocol
Performance	Rate			10 Mbps	1-34 Mbps	1-155 Mbps
	Range[1] @ 3 dB/km	5200m	4700 m	4700 m	4200 m	3000 m
	@ 5 dB/km	4000 m	3600 m	3600 m	3300 m	2450 m
	@10 dB/km	2550 m	2350 m	2350 m	2150 m	1650 m
	@17 dB/km	1790 m	1640m	1640 m	1520 m	1200 m
	@30 dB/km	1170m	1090m	1090m	1000 m	810 m
	Minimum Range	200m	200m	200m	200 m	200 m
	Bit error rate	Less than 1E - 9 (unfaded				
	MTBF	10 years				
Transmitter	Light source	3 x VCSELs				
	Wavelength	830 - 860 nm				
	Total Output power	21 mW				
	Beam divergence	2 mrad				
Receiver	Detector	Si PIN	Silicon Photodiode	Silicon Photodiode	Si PIN	Silicon Photodiode
	Field of view	5 mrad				
	Sensitivity	-50 dBm	-47 dBm	-47 dBm	-44 dBm	-36 dBm
Interface	Type	Electrical	Electrical	Copper 10 BaseT	Fiber Optic Transceiver - Multimode (Singlemode available upon request)	Fiber Optic Transceiver - Multimode (Singlemode available upon request)
	Connectors	BNC and RJ48 (STP)	Universal Connector	RJ45	ST other connectors available	SC other connectors available
	Impedance	E1: 75 Ohm or 120 Ohm T1:100 ohm				
	Cable	Coax or STP		STP		
	Cable loss	Supports short and Long haul trunks				
	Wavelength				850nm (other wavelengths available)	1300 nm (other wavelength available)
	Output power				-17 ± 2 dBm (mesured with a 62.5 micro fiber	-17 ± 3 dBm
	Receiver operating range				-14 to - 27 dBm	-14 to - 30 dBm
Power Supplly	Voltage range	Factory set: 100-240 VAC @ 50/60 Hz or 24-60 VDC				
	Power consumption	22 W				
Environmental Information	Operating temperature	-50˚ C to +50˚ C				
	Storage temperature	-50˚ C to +70˚ C				
	Humidity	95% non-condensing				
	Housing	Weatherproofing: IP66				
	Eye safety Class	1M				
Mechanical Design	Dimensions (mm	790 x 390 x 556 (AD-5000: 250x353x432				
	Weight Unit	18 kg				
	Acc.	20 kg				
Diagnostics	Indicators	Airlink: Flag, Electrical: Flag, Local loopback Receive Signal Strength (Digital Display)	Airlink: Flag, Sync E1 Ports: LED per port Receive Signal Strength (Digital Display)	Airlink: Flag, Data. 10BaseT: Flag, Data Receive Signal Strength (Digital Display)	Airlink: Flag, Sync., Fiber Optic: Flag, Sync. Alignment, Loopback, Receive Signal Strength (Digital Display)	Airlink: Flag, Sync., Fiber Optic: Flag, Sync. Alignment, Loopback, Receive Signal Strength (Digital Display
	Selectors	Termination , Electrical receive sensitivity, line incoding, LLB, RLB, IP address setting	Termination, Electrical receive sensitivity, Line incoding LLB, RLB, IP address setting	IP address setting	Data Rate, Alignment, Loopback (local)	Data Rate, Alignment, Loopback (local)
Management		SNMP Protocol - Optional Two pair of pins of the main RJ48 connector can be used for dry contacts purposes, for air link flag alarm and Electrical Flag alarm	SNMP Protocol - Optional 6 Dry Contact ouputs:4 for E1 Ports , 1 for air-link flag , 1 for air-link sync	SNMP Protocol - Optional one pair of pins of the main RJ45 connector can be used for dry contacts purposes, for air link flag alarm	SNMP protocol - Built-in with dedicated 10- Base TP interface (RJ 45)	SNMP protocol - Built-in with dedicated 10- Base TP interface (RJ 45) Two pairs of Pins of the management RJ45 connector can be used for dry contact purposes, for Airlink flag and F/O flag alarms
Standards Compliance	Jitter Specifications proposed for SONET/SDH equipment defined by the Bellcore Specifications: GR-253-CORE, Issue 2, December 1995 and ITU-T Recommendations: G.958 document. Typical Applications: OC-1, STS-3, ATM, FDDI, E3, Fast Ethernet etc... EN50081-1: 1991; EN50082-1:1998; EN55022: 1997; EN61000-4-2: 1995; EN61000-4-3: 1995; EN61000-4-4: 1995; EN61000-4-5:1995; ENV50142; EN61000-4-6: 1996/ENV50141; EN61000-4-8: 1993; EN61000-4-11:1994; EN61000-3-2:1995; IEC950, 1991, A1, A2, A3, A4; EN60950, 1992, A1, A2, A3, A4, A11; FCC part 15 Class A; UL1950, 3rd Edition (1995); CSA22.2, No.950 (1995) ; weather proofing IP66					

[1] @ 3 dB/km = Light rain (5-10 mm/hr) - Light haze
@ 5 dB/km = Light to medium rain (15-20 mm/hr) - Haze
@10 dB/km = Medium to heavy rain (45 mm/hr) - Light snow - Thin fog
@17 dB/km = Cloudburst (100 mm/hr) - Medium snow - Light fog
@30 dB/km = Rain (135 mm/hr) - Blizzard - Moderate fog

TereScope® 2000 – For Voice Connectivity - E1/T1 & 4x E1/4T1 Solutions

The TereScope® that never tires

The carrier class TereScope® 2000 provides a data rate of E1/T1 or 4xE1/T1 with an E1/T1 interfaces. TereScope® 2000 systems, like all TereScope units, are deployable within a matter of hours. TereScope 2000 supplies a connectivity that reaches up to 4.1 km and supports various protocols.

The TS2000 has two transmitters and an 8" RX lens - these features almost eliminate any scintillation influence and enhance the transceiver's reliability.

Features

- Accommodates **E1/ T1 and 4 x E1/4T1** protocols
- Distances up to 4.1 km
- Connection to dry contact box
- Built-in dry contacts
- SNMP - Optional

TereScope® 2000 - Technical Specifications

MODEL/ PROD CODE			TS2/D2/E1/VS or TS2/D2/T1/VS TS2000/E1 or T1	TS8/D2/4E1/VS or TS8/D2/4T1/VS TS2000/4E1 or 4T1
Applications/ Data Protocol			E1: 2.048 Mbps G.703/G.704 or T1:1,55Mbps	4E1: 4x2.048 Mbps G.703/G.704
Performance	Rate			
	Range[1] @ 3 dB/km		4100 m	3400 m
	@ 5 dB/km		3200 m	2700 m
	@10 dB/km		2150 m	1810 m
	@17 dB/km		1510 m	1290 m
	@30 dB/km		1000 m	870 m
	Minimum Range		200 m	190 m
	Bit error rate		Less than 1E - 9 (unfaded)	
	MTBF		10 years	
Transmitter	Light source		2x Lasers	
	Wavelength		830 - 860 nm	
	Total Output power		14 mW	
	Beam divergence		3.5 mrad	
Receiver	Detector		Si PIN	
	Field of view		5 mrad	
	Sensitivity		-50 dBm	-45 dBm
Interface	Type		Electrical	
	Connectors		RJ48 (STP)	Universal connector
	Impedance		E1: 120 Ohm , T1: 100 Ohm	E1: 75 Ohm or 120 Ohm, T1: 100 Ohm
	Cable		STP	Coax 75 Ohm or STP
	Cable loss		Supports Short and Long haul trunks	
Power Supplly	Voltage range		Factory set: 100 - 240 VAC @50/60 Hz or 24-60 VDC	
	Power consumption		10 W	
Environmental Information	Operating temperature		-50˚ C to +60˚ C	
	Storage temperature		-50˚ C to +70˚ C	
	Humidity		95% non-condensing	
	Housing		Weatherproofing: IP66	
	Eye safety Class		1M	
Mechanical Design	Dimensions (mm		790 x 390 x 556	
	Weight	Unit	16 kg	
		Accessories	13 kg	
Diagnostics	Indicators		Airlink: Flag, Electrical: Flag , Local loopback Receive Signal Strength (Digital Display)	Airlink: Flag, Sync. E1 Ports: LED per port. Receive Signal Strength (Digital Display)
	Selectors		Termination, Electrical receive sensitivity, Line incoding, Local Loopback, Remote loopBack, IP address setting	
Management			SNMP Protocol - Optional One pair of pins of the main RJ48 connector can be used for dry contacts purposes, for air link flag alarm and Electrical Flag alarm	SNMP card - Optional 6 Dry Contact ouputs:4 interface ports , 1 for air-link flag, 1 for air-link sync
Standards Compliance	EN50081-1:1991;EN50082-1:1998;EN55022:1997;EN61000-4-2:1995;EN61000-4-3:1995;EN61000-4-4:1995;EN61000-4-5:1995;ENV50142;EN61000-4-6:1996/ENV50141;EN61000-4-8:1993;EN61000-4-11:1994;EN61000-3-2:1995;IEC950,1991,A1,A2,A3,A4; EN60950,1992,A1,A2,A3,A4,A11;FCC part 15 Class A;UL1950,3rd Edition (1995);CSA22.2,No.950 (1995) ;weather proofing IP66			

[1] @ 3 dB/km = Light rain (5-10 mm/hr) - Light haze
@ 5 dB/km = Light to medium rain (15-20 mm/hr) - Haze
@10 dB/km = Medium to heavy rain (45 mm/hr) - Light snow - Thin fog
@17 dB/km = Cloudburst (100 mm/hr) - Medium snow - Light fog
@30 dB/km = Rain (up to 180 mm/hr) - Blizzard - Moderate fog

TereScope® - The Most Comprehensive Free Space Optics Wireless solution

TereScope® 800 - up to 155Mbps solutions

The strong and compact TereScope®

The TereScope® 800 is a solution with an innovative and compact design.

The TS800/155* is a high quality product designed for the medium range connections reaching distances of up to 1000 m.
The TS800/155 supports most of the prevalent protocols in the 34-155 Mbps range. Support for a special protocol, which is not on the list, can be ordered after coordination with MRV. This model can be used for Open Protocol applications, thus ensuring complete transparency (including all data in the range of 1-155 Mbps.)
* The TS800 is currently available in its 155 model; The E1/T1, Ethernet and 34 models will be available before the end of 2006.

Features

- Data rate between **1-155 Mbps**
- Supports protocols: E3/T3, 4xE1/T1, Ethernet, Fast Ethernet, FDDI, OC-3, ATM and STM-1
- Distances up to 1000 m
- Built-in SNMP management
- Connection to dry contact management box (RSM-DC) – optional
- Connection to RSM box
- FUSION option - Failover to radio backup

TereScope® 800 - Technical Specifications

MODEL/ PROD CODE			TS155/C2/XXX/VS or TS155/C2/XXX/FS TS800/155 or TS800/155-F
Applications/ Data Protocol			Fast Ethernet, ATM, OC3, STM1, SMPTE, E3, T3, OC1/STMO & Open Protocol
Performance	Rate		1-155 Mbps
	Range @ 3 dB/km		1900 m
	@ 5 dB/km		1600 m
	@10 dB/km		1150 m
	@17 dB/km		850 m
	@30 dB/km		600 m
	Minimum Range		10 m
	Bit error rate		Less than 1E - 12 (unfaded)
	MTBF		10 years
Transmitter	Light source		1 laser
	Wavelength		830 - 860 nm
	Total Output power		28 mW
	Beam divergence		3 mrad
Receiver	Detector		Silicon Photodiode
	Field of view		14 mrad
	Sensitivity		-37 dBm
Interface	Type		Fiber Optic Transceiver - Multimode (Singlemode available upon request)
	Connectors		SC (other connectors available)
	Wavelength		1300 nm (other wavelengths available)
	Output power		-17 to 3 dBm
	Receiver operating range		-14 to -30 dBm
Power Supplly	Voltage range		Factory set: 100 - 240 VAC @50/60 Hz or 24-60 VDC
	Power consumption		10 W
Environmental Information	Operating temperature		-50˚ C to +60˚ C
	Storage temperature		-50˚ C to +70˚ C
	Humidity		95% non-condensing
	Housing		Weatherproofing: IP66
	Eye safety Class		1M
Mechanical Design	Dimensions (mm		470 x 282 x 390
	Weight	Unit	5 kg
		Accessories	3,5 kg
Diagnostics	Indicators		Airlink: Flag, Sync. Fiber Optic: Flag, Sync., Alignment mode, Loopback mode, Remote LoopBack mode,Fusion mode and activity, Software mode,Laser status, Management Tx and RX, F/O Redundant Link and Sync., Receive Signal Strength (Digital Display)
	Selectors		Data Rate, Alignment, Loopback (local), Remote LoopBack, Alignment Signal Attenuation, Laser power off, Fusion, Window Heater (if exists), Ip address , Control Mode.
Management			2 Dry Contacts (AirLink and FO Link). In TS155/C2/YUWVMS and TS155/C2/YUWFMS:RSM-SNMP Built in
Standards Compliance	Jitter Specifications proposed for SONET/SDH equipment defined by the Bellcore Specifications: GR-253-CORE, Issue 2, December 1995 and ITU-T Recommendations: G.958 document. Typical Applications: OC-1, STS-3, ATM, FDDI, E3, Fast Ethernet etc... EN50081-1:1991; EN50082-1:1998; EN55022:1997; EN61000-4-2:1995; EN61000-4-3:1995; EN61000-4-4:1995; EN61000-4-5:1995; ENV50142; EN61000-4-6:1996/ENV50141; EN61000-4-8:1993; EN61000-4-11:1994; EN61000-3-2:1995; IEC950, 1991, A1, A2, A3, A4; EN60950, 1992, A1, A2, A3, A4, A11; FCC part 15 Class A; UL1950, 3rd Edition (1995); CSA22.2, No.950 (1995) ; weather proofing IP66		

@ 3 dB/km = Light rain (5-10 mm/hr) - Light haze
@ 5 dB/km = Light to medium rain (15-20 mm/hr) - Haze
@10 dB/km = Medium to heavy rain (45 mm/hr) - Light snow - Thin fog
@17 dB/km = Cloudburst (100 mm/hr) - Medium snow - Light fog
@30 dB/km = Rain (up to 180 mm/hr) - Blizzard - Moderate fog

TereScope® 700 - up to GE

High Bandwidth – Short Distances – Excellent Price/Performance

The TS700 series provides high speed Free Space optics (FSO) connectivity for a variety of first mile applications. Operating at full wire speed data rates of 1 Mbps to 1.25 Gbps, the TS700 series is rapidly deployable, without requiring right-of-way or government permits for installation, providing you with communication links in hours instead of weeks or months.

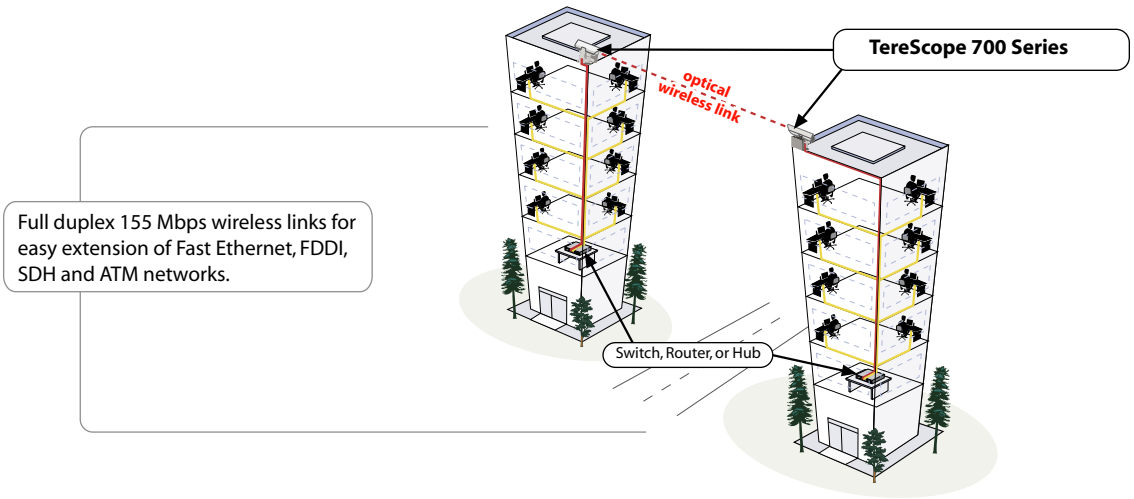
The TS700 is a high quality product specially designed for short distance connections reaching distances of up to 400 m at the best price performance ratio possible.

The TS700 has three models: TS700/100, TS700/155 and TS700/G.

- The TS700/100 was designed specifically for Fast Ethernet. This transceiver has a copper 100BaseT interface. The TS700/100 low voltage version (V3) has a Power over Ethernet (PoE) configuration that operates in accordance with international standards.
- A standard TS700/155 has 4 operational modes: E3, T3, Fast Ethernet and OC3 (155 Mbps). It is possible to order optional Open Protocol or customized protocol (should be specified in the order).
- The TS700/G operates at Gigabit Ethernet and Fibre Channel.

Features

- Accommodates 1.0625 & 1.25 Gbps networks, for protocols such as: **Fibre Channel and Gigabit Ethernet**, or 1 to 155 Mbps networks, for protocols such as: E3/T3, Fast Ethernet, FDDI, ATM, OC-3 and STM-1
- PoE (power over Ethernet) in the TS700/100 model
- Distances up to 400 meters
- Built-in dry contacts
- SNMP – optional (in TS700/G the SNMP is included)
- Compact solution



TereScope® 700 - Technical Specifications

MODEL/ PROD CODE			TS700/100 TS100/A/FET/VS, Standard model: TS100/A/FET/V3	TS700/155 TS155/A/XXX/VS, Standard model: TS155/A/M3C/VS	TS700/G TS1000/A/XXX/VS, Standard model: TS1000/A/M8C/VS
Applications/ Data Protocol			Fast Ethernet	T3, E3, Fast Ethernet and ATM	Gigabit-Ethernet, Fiber Channel
Performance	Rate		100 Mbps	1-155 Mbps	1.062Gbps & 1.25 Gbps
	Range @ 3 dB/km		880 m	880 m	1100 m
	@ 5 dB/km		770 m	770 m	950 m
	@10 dB/km		600 m	600 m	730 m
	@17 dB/km		480 m	480 m	570 m
	@30 dB/km		360 m	360 m	425 m
	Minimum Range		10 m	10 m	10 m
	Bit error rate		Less than 1E - 12 (unfaded)		
	MTBF		10 years		
Transmitter	Light source		1 VCSELs		
	Wavelength		830 - 860 nm		
	Total Output power		5 mW		16 mW
	Beam divergence		3-4 mrad		3 mrad
Receiver	Detector		Silicon Photodiode		APD
	Field of view		14 mrad		8 mrad
	Sensitivity		-34 dBm		-33 dBm
Interface	Type		Electrical - 100Base Tx	Fiber Optic Transceiver - Multimode (Singlemode available upon request)	
	Connectors		RJ45	SC (other connectors available)	
	Cable		STP		Up to 220m lengh @ 62.5um & Up to 5000m length @ 50um
	Wavelength			1300 nm (other wavelengths available)	850 nm (other wavelengths available)
	Output power			-17 to +/- 3 dBm	-4 to - 9.5 dBm
	Receiver operating range			-14 to -30 dBm	0 to -17 dBm
Power Supplly	Voltage range		Factory set: 100 - 240 VAC @50/60 Hz or 24-60 VDC POE (Power over Ethernet): In V3 version (Low voltage)	Factory set: 100 - 240 VAC @50/60 Hz or 24-60 VDC	
	Power consumption		10 W		
Environmental Information	Operating temperature		-50˚ C to +60˚ C		-30˚ C to +50˚ C
	Storage temperature		-50˚ C to +70˚ C		-50˚ C to +70˚ C
	Humidity		95% non-condensing		
	Housing		Weatherproofing: IP66		
	Eye safety Class		1M		
Mechanical Design	Dimensions (mm		470 x 282 x 390		
	Weight	Unit	5 kg		
		Accessories	3,5 kg		
Diagnostics	Indicators		Airlink: Flag, Sync 100Base Tx: Flag, Sync. Loopback, Receive Signal Strength (Digital Display)	Airlink: Flag, Fiber Optic: Flag, Sync. Receive Signal Strength (Digital Display)	Airlink: Flag, Fiber Optic: Flag, Laser enabled Receive Signal Strength (Digital Display)
	Selectors		Alignment, Loopback (local), IP address, Auto negotation	Data Rate, Alignment, Loopback (local)	Data Rate, Power attenuator (for short distance), IP address setting
	Diagnostic				4 dry contacts for: Airlink Flag, Airlink Laser enabled, Fiber Optic Flag and Power
Management			SNMP protocol - Optional		SNMP protocol - Built-in
Standards Compliance	ITU G.703, G.704, G.706, G.736, G.737, G.738, G.739, G.742, G.775, G.823; EN50081-1:1991; EN50082-1:1998; EN55022:1997; EN61000-4-2:1995; EN61000-4-3:1995; EN61000-4-4:1995; EN61000-4-5:1995/ ENV50142; EN61000-4-6:1996/ENV50141; EN61000-4-8:1993; EN61000-4-11:1994; EN61000-3-2:1995; IEC 950, 1991, A1, A2, A3, A4 ; EN 60950, 1992, A1, A2, A3, A4, A11 UL1950, 3rd Edition (1995) CSA 22.2, No.950 (1995) ; Weatherproof: IP66				

TereScope® 702- Technical Specifications

MODEL/ PROD CODE			TS2/A/E1/VS or TS2/A/T1/VS TS702/E1 or TS702/T1	TS8/A/4E1/VS or TS8/A/4T1/VS TS702/4E1 or TS702/4T1	TS702/ETH TS10/A/ETH/VS
Applications/ Data Protocol			E1 - 2.048 Mbps, G.703 T1 - 1.55 Mbps, G.704	4xE1, 4xT1 (G.703, G.704)	Ethernet
Performance	Rate				10Mbps
	Range @ 3 dB/km		1000 m	780 m	500 m
	@ 5 dB/km		900 m	700 m	450 m
	@10 dB/km		710 m	550 m	380 m
	@17 dB/km		570 m	450 m	320 m
	@30 dB/km		400 m	340 m	250 m
	Minimum Range		0 m	0 m	0 m
	Bit error rate		Less than 1E - 9 (unfaded)	Better than 1E - 9 (unfaded)	Better than 1E - 9 (unfaded)
	MTBF		10 years		
Transmitter	Light source		1 VCSELs	1 VCSELs	1 LED
	Wavelength		830 - 860 nm		
	Total Output power		0.8 mW	0.8 mW	5 mW
	Beam divergence		3-4 mrad	3-4 mrad	12 mrad
Receiver	Detector		Si PIN		
	Field of view		14 mrad		
	Sensitivity		-50 dBm	-45 dBm	-42 dBm
Interface	Type		Electrical		Copper - 10BaseT
	Connectors		RJ45 (STP)	RJ45 (STP)	RJ45
	Cable		Coax: 75 Ohm STP: 120 Ohm or 100Ohm	120 Ohm for E1 input or 100 Ohm for E1 input	STP
	Wavelength				
	Output power				
	Receiver operating range				
Power Supplly	Voltage range		Factory set: 100 - 240 VAC @50/60 Hz or 24-60 VDC		100 - 240 VAC only
	Power consumption		7W	10W	7W
Environmental Information	Operating temperature		-50˚ C to +60˚ C		
	Storage temperature		-50˚ C to +70˚ C		
	Humidity		95% non-condensing		
	Housing		Weatherproofing: IP66		
	Eye safety Class		1M	1M	1M
Mechanical Design	Dimensions (mm		430 x 216 x 290		
	Weight	Unit	3.5 kg		
		Accessories			
Diagnostics	Indicators		Airlink: Flag, Sync Electrical: Flag, Sync. Loopback, Receive Signal Strength (Digital Display)		Airlink: Flag, Sync 100Base Tx: Flag, Sync. Receive Signal Strength (Digital Display)
	Selectors		Termination, Receive sensitivity, Line coding, Loopback (local), unbalanced (BNC) grounding	Termination, Receive sensitivity, Remote Loopback, Line coding, Loopback (local), Air Tx Output Power (attenuation (dB)	
	Diagnostic				
Management			Using SNMP for transmission of all indications (See Indicators) Interface: Ethernet, Connector: RJ45, Compatible with MegaVisionWeb™		
Standards Compliance	ITU G.703, G.704, G.706, G.736, G.737, G.738, G.739, G.742, G.775, G.823; EN50081-1:1991; EN50082-1:1998; EN55022:1997; EN61000-4-2:1995; EN61000-4-3:1995; EN61000-4-4:1995; EN61000-4-5:1995/ ENV50142; EN61000-4-6:1996/ENV50141; EN61000-4-8:1993; EN61000-4-11:1994; EN61000-3-2:1995; IEC 950, 1991, A1, A2, A3, A4 ; EN 60950, 1992, A1, A2, A3, A4, A11 UL1950, 3rd Edition (1995) CSA 22.2, No.950 (1995) ; Weatherproof: IP66			

TereScope® 707- Technical Specifications

MODEL/ PROD CODE		TS707/E1 TS2/C2/E1/VS TS707/T1 TS2/C2/T1/VS	TS707/4E1 TS8/C2/4E1/VS TS707/4T1 TS8/C2/4T1/VS	TS707/ETH TS10/C2/ETH/VS
Applications/ Data Protocol		E1 - 2.048 Mbps, G.703 T1 - 1.55 Mbps, G.704	4xE1, 4xT1 (G.703, G.704)	Ethernet
Performance	Rate			10Mbps
	Range @ 3 dB/km	2400 m	2000 m	2000 m
	@ 5 dB/km	2000 m	1600 m	1600 m
	@10 dB/km	1400 m	1200 m	1200 m
	@17 dB/km	1000 m	900 m	900 m
	@30 dB/km	700 m	630 m	630 m
	Minimum Range	0 m	0 m	0 m
	Bit error rate	Less than 1E - 9 (unfaded)	Better than 1E - 9 (unfaded)	Better than 1E - 9 (unfaded)
	MTBF	10 years		
Transmitter	Light source	1 VCSELs	1 VCSEL	1 VCSEL
	Wavelength	830 - 860 nm		
	Total Output power	8 mW		
	Beam divergence	3.5 mrad		
Receiver	Detector	Si PIN		
	Field of view	14 mrad		
	Sensitivity	-50 dBm	-45 dBm	-45 dBm
Interface	Type	Electrical	Electrical	Copper - 10BaseT
	Connectors	RJ45 (STP)	RJ48 (STP)	RJ48
	Cable	Coax: 75 Ohm STP: 120 Ohm or 100Ohm	120 Ohm for E1 input or 100 Ohm for E1 input	STP
	Wavelength			
	Output power			
	Receiver operating range			
Power Supplly	Voltage range	Factory set: 100 - 240 VAC @50/60 Hz or 24-60 VDC		
	Power consumption	7W	10W	
Environmental Information	Operating temperature	-50˚ C to +60˚ C		
	Storage temperature	-50˚ C to +70˚ C		
	Humidity	95% non-condensing		
	Housing	Weatherproofing: IP66		
	Eye safety Class	1M		
Mechanical Design	Dimensions (mm	430 x 216 x 290		
	Weight Unit	3.5 kg		
	Accessories			
Diagnostics	Indicators	Airlink: Flag, Sync Electrical: Flag, Sync. Loopback, Receive Signal Strength (Digital Display)		Airlink: Flag, Sync 100Base Tx: Flag, Sync. Loopback, Receive Signal Strength (Digital Display)
	Selectors	Termination, Receive sensitivity, Line coding, Loopback (local), unbalanced (BNC) grounding	Termination, Receive sensitivity, Remote Loopback, Line coding, Loopback (local), Air Tx Output Power (attenuation (dB)	
	Diagnostic			
Management		Using SNMP for transmission of all indications (See Indicators) Interface:Ethernet, Connector: RJ45, Compatible with MegaVisionWeb™	Using SNMP for transmission of all indications (See Indicators) Interface:Ethernet, Connector: RJ45, Compatible with MegaVisionWeb™	
Standards Compliance	ITU G.703,G.704,G.706,G.736,G.737,G.738,G.739,G.742,G.775,G.823;EN50081-1:1991;EN50082-1:1998;EN55022:1997; EN61000-4-2:1995;EN61000-4-3:1995;EN61000-4-4:1995;EN61000-4-5:1995/ENV50142; EN61000-4-6:1996/ENV50141;EN61000-4-8:1993;EN61000-4-11:1994;EN61000-3-2:1995;IEC 950,1991,A1,A2,A3,A4;EN 60950,1992,A1,A2,A3,A4,A11 UL1950,3rd Edition (1995) CSA 22.2,No.950 (1995); Weatherproof:IP66			

@ 3 dB/km = Light rain (5-10 mm/hr) - Light haze
@ 5 dB/km = Light to medium rain (15-20 mm/hr) - Haze
@10 dB/km = Medium to heavy rain (45 mm/hr) - Light snow - Thin fog
@17 dB/km = Cloudburst (100 mm/hr) - Medium snow - Light fog
@30 dB/km = Rain (up to 180 mm/hr) - Blizzard - Moderate fog

TereScope® 1/ TereScope® 1000P - Fast Ethernet & Gigabit Ethernet

All optics wireless

The TereScope 1 (TS1) is an innovative solution for wireless optical communications without electronics. The TS1 is an optical wireless system, which sits on rooftops and provides wireless fiber connection speeds without electronics or electricity power. TS1 responds to today's as well as tomorrow's user services demands, while providing higher potential capacity, license free transmission, at lower costs, over the air.

TereScope 1 Photonic Air Link (PAL) systems (outdoor head) are directly connected via optical fibers to the OptiSwitch® module that functions as the TereScope 1 network interface unit (NIU) or to the Media Converter MC102/p (indoor). Offering data rates of 1 Mbps to1.25 Gbps, at distances of up to 680 m, these systems avoid the need for costly and time-consuming fiber runs in developed areas. Easy to install and align, these systems can be deployed almost instantly to expand your network as needed. Designed for short distance connectivity, and offered at low cost,
TereScope® 1 is an ideal and highly reliable solution for dense urban areas and for Ethernet traffic based networks.

Features

- Accommodates 1 Mbps to1.25 Gbps Mbps networks, for **Fast Ethernet** and **Gigabit Ethernet**
- Distances up to 680 m
- Immediate deployment
- 100 Mbps or 1 Gbps Full Duplex transmission
- Intrinsically EMI/RFI immune
- No power needed on rooftop

Applications

- Point-to-point LAN extension
- Access connectivity
- Difficult terrain
- Fiber backup

MRV

All Optical Wireless

TereScope® 1 - Technical Specifications

MODEL/ PROD CODE		TS1/A TS1/A/DST	TS1/C TS1/C/DST
Applications/ Data Protocol		Fast Ethernet , 4xE1	
Performance	Rate	100 Mbps	
	Range [1] @ 10 dB/km	280 m	550 m
	@ 17 dB/km	240 m	470 m
	@ 30 dB/km	200 m	360 m
	@60 dB/km	150 m	240 m
	Minimum Range	0 m	30 m
	Bit error rate	Less than 10E - 12 (unfaded)	
	MTBF	Over 10 years	
Transmitter	Light source	1x VCSEL	
	Wavelength	850 nm	
	Total Output power	2.5 mW	3.5 mW
	Beam divergence	6 mrad	3.65 mrad
	Field of view	4.5 mrad	6 mrad
	Sensitivity	-33dbm	
	Fiberoptic cable	Custom Multimode	
	Connectors	ST	
	Max cable length	50 m Custom MM Cable	
Power Suppply	Voltage range	Factory set: 100 - 240 VAC @50/60 Hz or 24-60 VDC	
	Power consumption	6 W	
Environmental Information Outdoor Unit	Operating temperature	-40° C to +60° C	
	Storage temperature	-40° C to +60° C	
	Humidity	Less than 90% non-condensing	
	Housing	Weatherproof IP 65	
Mechanical Design Outdoor Units	Dimensions (mm)	248 x 155 x 375	
	Weight (kg)	Unit: 3 Kg - Accessories: 1.5 Kg	
Environmental Information Indoor Unit	Operating temperature	0° C to +40° C	
	Storage temperature	-40° C to +70° C	
	Humidity	Less than 85% non-condensing	
	Eye safety Class	1M	
Mechanical Design Indoor Units	Dimensions (mm)	120 x 180 x 45	
	Weight (kg)	0.6 Kg	
Management		Manageable through MegaVision Web™	

[1] @17 dB/km = Moderate rain
@30 dB/km = Blizzard, cloudburst
@60 dB/km = Light to moderate fog

TereScope® 1000P/C - Technical Specifications

MODEL/ PROD CODE		TS1/B/GIGA TS1/C/GIGA/DST
Applications/ Data Protocol		Gigabit Ethernet
Performance	Rate	1 Gbps
	Range [1] @ 10 dB/km	680 m
	Range [1] @ 17 dB/km	530 m
	@ 30 dB/km	400 m
	@60 dB/km	265 m
	Minimum Range	0m (with attenuator). 120m w/o attenuator
	Bit error rate	Less than 10E - 12 (unfaded)
	MTBF	Over 10 years
Transmitter	Light source	1x VCSEL
	Wavelength	850 nm
	Total Output power	6.5 mW
	Beam divergence	2 mrad
	Eye safety Class	1M
Receiver	Field of view	2.4 mrad
Interface	Connectors	ST
	Max cable length	50 m Custom MM Cable
Indoor Unit: Media converter	Part number	**MC102G/SX/GPALC/***
	TX Power	12.5 mW
	RX sensitivity	-30 dBm
	Power supply	HV :100-240VAC 50/60Hz or LV: 24-60VDC
	Connection to Giga-PAL	ST Connectors
	Connection to Network	SC MM 850 nm (1000Base-SX)
Environmental Information Oudoor Unit	Operating temperature	-40° C to + 60° C
	Storage temperature	-40° C to + 60° C
	Humidity	Less than 90% non-condensing
Environmental Information Indoor Unit	Operating temperature	0° C to + 40° C
	Storage temperature	-40° C to +70° C
	Humidity	Less than 85% non-condensing
Mechanical Design	Housing	Weatherproofing: IP65
	Dimensions (mm	410 x 244 x 325 mm 16.14x9.60x12.8 Inch
	Weight	5.5 Kg/12.13lb including accessories
Standards Compliance	Jitter Specifications proposed for SONET/SDH equipment defined by the Bellcore Specifications: GR-253-CORE, Issue 2, December 1995 and ITU-T Recommendations: G.958 document. Typical Applications: OC-1, STS-3, ATM, FDDI, E3, Fast Ethernet etc... EN50081-1:1991; EN50082-1:1998; EN55022:1997; EN61000-4-2:1995; EN61000-4-3:1995; EN61000-4-4:1995; EN61000-4-5:1995; ENV50142; EN61000-4-6:1996/ENV50141; EN61000-4-8:1993; EN61000-4-11:1994; EN61000-3-2:1995; IEC950,1991, A1, A2, A3, A4; EN60950,1992, A1, A2, A3, A4, A11; FCC part 15 Class A; UL1950, 3rd Edition (1995); CSA22.2, No.950 (1995); weather proofing IP66	

[1] @ 3 dB/km = Light rain (5-10 mm/hr) - Light haze
@ 5 dB/km = Light to medium rain (15-20 mm/hr) - Haze
@10 dB/km = Medium to heavy rain (45 mm/hr) - Light snow - Thin fog
@17 dB/km = Cloudburst (100 mm/hr) - Medium snow - Light fog
@30 dB/km = Rain (up to 180 mm/hr) - Blizzard - Moderate fog

(*) Media Converter Power: for High Voltage: 2
for Low Voltage: 3

Order Information

Product	Model	Protocols supported	Description
TereScope® 1000 - Up to Gigabit Ethernet			
TS1000/A/XYZ/V*	TereScope 700/G	Gigabit Ethernet Fibre Channel	TereScope700/G, Free Space Optics 400m@30db/km and 1000m@3db/km (clear weather), Selectable Protocol Link: Giga-Ethernet and Fiber Channel, visual alignment (XYZ: interface options: M8C, S3C, S5C - Standard model: TS1000/A/M8C/VS). RSM-SNMP built in. Power supply VS or V3*. Basic accessories kit supplied with the link: JMP and JITK
TS1/C/GIGA/DST	TereScope 1000P/C	Gigabit Ethernet	TereScope 1000P/C, Passive Free Space Optics, 400m@30db/km and 990m@3db/km (clear weather), Gigabit Ethernet Link, Minimum distance : 120m , for installation less than 120m please look below at FO-03/PALG/AT10 , visual alignment
TS1000/G/XYZ/V*	TereScope 5000/G	Gigabit Ethernet Fibre Channel + Protocols between 100 Mbps and 1.25 Gbps	TereScope5000/G, 8 inch receiver Free Space Optics 850m@30db/km and 3000m@3db/km (clear weather), Open Protocol 100-1250Mbps with clock recovery, visual alignment (Standard model: TS1000/G/M8C/VS). RSM-SNMP included, Removable interface, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TS1000/G/XYZ/F*	TereScope 5000/G-F	Gigabit Ethernet Fibre Channel + Protocols between 100 Mbps and 1.25 Gbps	TereScope5000/G-F, with built in Fusion option, 8 inch receiver Free Space Optics 850m@30db/km and 3000m@3db/km (clear weather), Open Protocol 100-1250Mbps with clock recovery, visual alignment (Standard model: TS1000/G/M8C/FS). RSM-SNMP included, Removable interface, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TereScope® 155 - Up to 155 Mbps			
TS155/A/XYZ/V*	TereScope 700/155	Selectable Protocol: E3 (34 Mbps) T3 (45 Mbps) Fast Ethernet (100 Mbps) OC3, ATM, STM-1 (155 Mbps)	TereScope700/155, 360m@30db/km and 880m@3db/km (clear weather), Selectable Protocol Link 34 (E3), 45 (T3) ,100 (Fast-Ethernet) or 155Mbit/s (OC3, ATM, STM-1) , visual alignment (for interface options see XYZ coding - Standard model: TS155/A/M3C/VS). Power supply VS or V3*. RSM-SNMP Optional, Basic accessories kit supplied with the link: JMP and JITK
TS155/C2/XYZ/V*	TereScope 800/155	Open Protocol: 1-155Mbps Selectable Protocol: E3 (34 Mbps) T3 (45 Mbps) OC1, STM0 (52 Mbps) Fast Ethernet (100 Mbps) OC3, ATM, STM-1 (155 Mbps) SMPTE (143 Mbps)	TereScope800/155, Free Space Optics 600m@30db/km and 1900m@3db/km (clear weather), Open Protocol 1-155Mbps, Selectable Protocols 34-155Mbit/s, visual alignment (for interface options see XYZ coding, Standard Model: TS155/C2/M3C/VS). Fusion: optional, SNMP: optional, Power supply VS or V3*. Basic accessories kit supplied with the link: JMP and JITK
TS155/C2/XYZVM*	TereScope 800/155		TereScope800/155 with built-in SNMP Mananagement, Free Space Optics 600m@30db/km and 1900m@3db/km (clear weather), Open Protocol 1-155Mbps, Selectable Protocols 34-155Mbit/s, visual alignment (for interface options see XYZ coding, Standard Model: TS155/C2/M3CVMS). Fusion: optional, Power supply VS or V3*. Basic accessories kit supplied with the link: JMP and JITK
TS155/C2/XYZ/F*	TereScope 800/155-F		TereScope800/155-F with built-in Fusion option, Free Space Optics 600m@30db/km and 1900m@3db/km (clear weather), Open Protocol 1-155Mbps, Selectable Protocols 34-155Mbit/s, visual alignment (for interface options see XYZ coding, Standard Model: TS155/C2/M3C/FS). SNMP: optional, Power supply VS or V3*. Basic accessories kit supplied with the link: JMP and JITK
TS155/C2/XYZFM*	TereScope 800/155-F		TereScope800/155-F with built-in SNMP Management and Built in Fusion option, Free Space Optics 600m@30db/km and 1900m@3db/km (clear weather), Open Protocol 1-155Mbps, Selectable Protocols 34-155Mbit/s, visual alignment (for interface options see XYZ coding, Standard Model: TS155/C2/M3C/FMS). , Power supply VS or V3*. Basic accessories kit supplied with the link: JMP and JITK
TS155/E2/XYZ/V*	TereScope 4000/155		TereScope4000/155, Free Space Optics 810m@30db/km and 3000m@3db/km (clear weather), Open Protocol 1-155Mbps, Selectable Protocol, Selectable Protocols 34-155Mbit/s, visual alignment (for interface options see XYZ coding - Standard model: TS155/E2/M3C/VS). SNMP included, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TS155/E2/XYZ/F*	TereScope 4000/155-F		TereScope4000/155-F, with built-in Fusion option, Free Space Optics 810m@30db/km and 3000m@3db/km (clear weather), Open Protocol 1-155Mbps, Selectable Protocols 34-155Mbit/s, visual alignment (for interface options see XYZ coding - Standard model: TS155/E2/M3C/FS). SNMP included, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TS155/G/XYZ/V*	TereScope 5000/155		TereScope5000/155, 8 inch receiver Free Space Optics 1185m@30db/km and 5400m@3db/km (clear weather), Open Protocol 1-155Mbps, Selectable Protocols 34-155Mbit/s, visual alignment (for interface options see XYZ coding - Standard model: TS155/G/M3C/VS). RSM-SNMP included, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TS155/G/XYZ/F*	TereScope 5000/155-F		TereScope5000/155-F, with buit-in Fusion option, 8 inch receiver Free Space Optics 1185m@30db/km and 5400m@3db/km (clear weather), Open Protocol 1-155Mbps, Selectable Protocols 34-155Mbit/s, visual alignment (for interface options see XYZ coding - Standard model: TS155/G/M3C/FS). RSM-SNMP included, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TereScope® 100 - Fast Ethernet			
TS1/A/DST	TereScope 1	Fast Ethernet (100 Mbps)	TereScope 1, Passive Free Space Optics, 200m@30db/km and 340m@3db/km (clear weather), Fast Ethernet Link, 100Mbit/s, visual alignment.
TS1/C/DST	TereScope 1		TereScope 1, Passive Free Space Optics, 360m@30db/km and 830m@3db/km (clear weather), Fast Ethernet Link, 100Mbit/s, visual alignment.
TS100/A/FET/V*	TereScope 700/100		TereScope700/100, Free Space Optics 360m@30db/km and 880m@3db/km (clear weather), Fast-Ethernet (100Mbps) link, 100BaseT interface, visual alignment . Power supply VS or V3*. The PoE (Power over Ethernet) feature is included in the V3 (low voltage) version. RSM-SNMP Optional, Basic accessories kit supplied with the link: JMP and JITK

All Optical Wireless

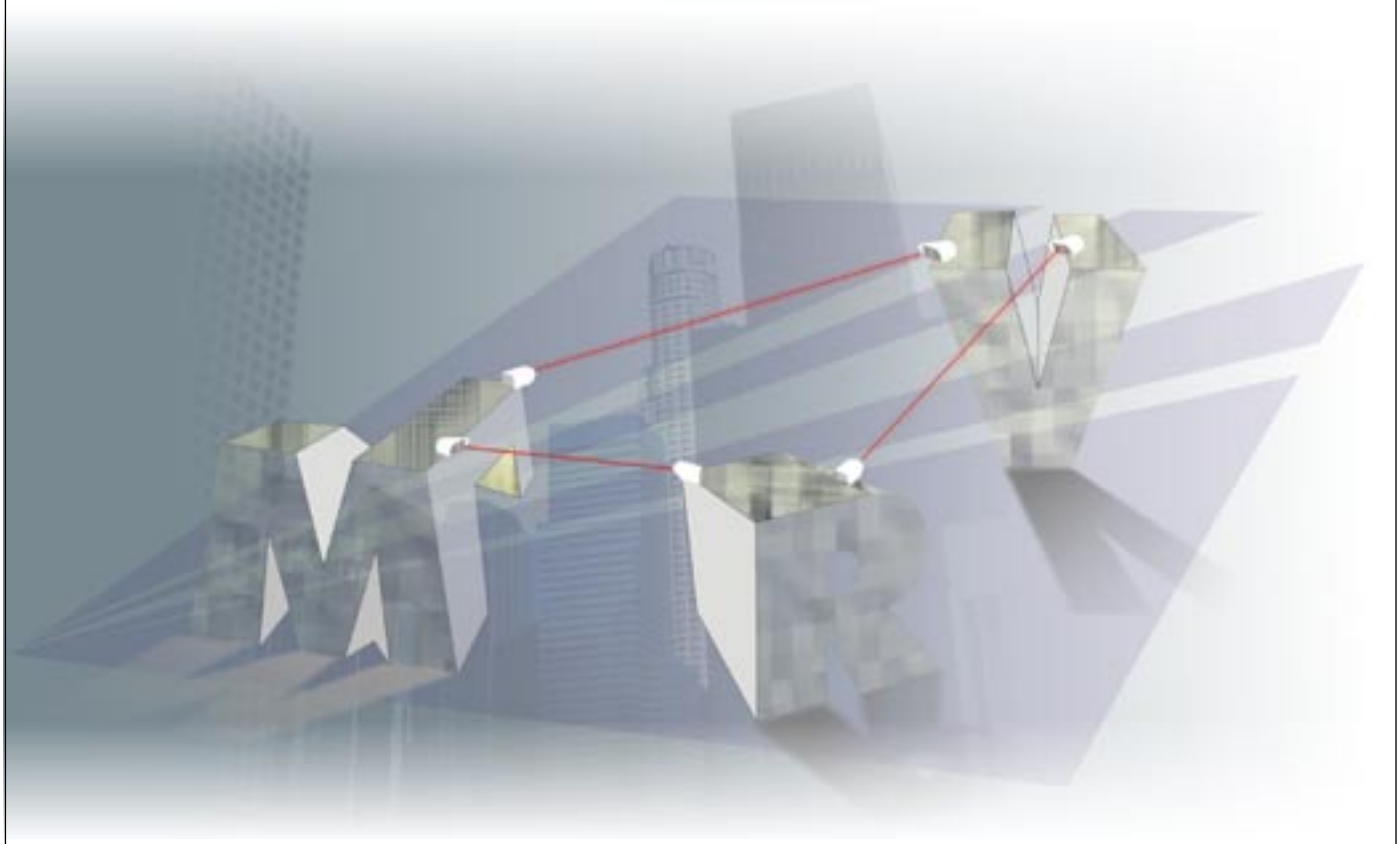
Order Information

TereScope® 34 - TereScope® Open Protocol (OP) (1-34 MBPS)			
TS34/E2/XYZ/V*	TereScope 4000/34	Open Protocol: 1-34 Mbps	TereScope4000/34, 8 inch receiver Free Space Optics 1000m@30db/km and 4100m@3db/km (clear weather), Open Protocol link 1-34Mbps, visual alignment (for interface options see XYZ coding - Standard model: TS34/E2/M8T/VS). RSM-SNMP Optional, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TereScope® 10 - TereScope® Ethernet (Ethernet 10 Mbps)			
TS10/A/ETH/VS	TereScope 702/ETH	Ethernet (10 Mbps)	TereScope702/ETH ("EtherLight") ,Free Space Optics 250m@30db/km ETHERNET Link , 10 Mbit/s, visual alignment (RJ45). Power supply V1 and V2 (user selectable)*. Basic accessories kit supplied with the link:JMP.
TS10/C2/ETH/V*	TereScope 707/ETH		TereScope707/ETH, Free Space Optics 610m@30db/km and 2000m@3db/km (clear weather), ETHERNET Link, 10 Mbit/s, visual alignment (RJ45).Power supply VS or V3*. RSM-SNMP Optional, Important Remark: This model can be powered via standard data cable (CAT 5, RJ48 Connector) - to be specified with order. Basic accessories kit supplied with the link:JMP.
TS10/E2/ETH/V*	TereScope 4000		TereScope4000/ETH, 8 inch receiver Free Space Optics 1090m@30db/km and 4700m@3db/km (clear weather), ETHERNET Link , 10 Mbit/s, visual alignment (RJ45), visual alignment. RSM-SNMP Optional, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TS10/G/ETH/V*	TereScope 5000/ETH		TereScope5000/ETH, 8 inch receiver Free Space Optics 1360m@30db/km and 6500m@3db/km (clear weather), Ethernet Link , 10 Mbit/s, visual alignment (RJ45), visual alignment. SNMP-RSM included, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TereScope® MUX - TereScope® 4E1 or 4T1			
TS8/A/4E1/V* **TS8/A/4T1/V***	TereScope 702/4E1 TereScope 702/4T1	4 x E1 4 x T1	TereScope702/4E1 or TereScope702/4T1, Free Space Optics 340m@30db/km and 780m@3db/km (clear weather), 4E1 or 4T1 Link, G.703/G.704 , visual alignment (interface RJ48, STP). Power supply VS or V3 * . RSM-SNMP Optional, Basic accessories kit supplied with the link: JMP.
TS8/C2/4E1/V* **TS8/C2/4T1/V***	TereScope 707/4E1 TereScope 707/4T1		TereScope707/4E1 or TereScope707/4T1, Free Space Optics 610m@30db/km and 2000m@3db/km (clear weather), 4E1 or 4T1 Link, G.703/G.704 , visual alignment (interface RJ48, STP). Power supply VS or V3 * . RSM-SNMP Optional, Basic accessories kit supplied with the link: JMP
TS8/D2/4E1/V* **TS8/D2/4T1/V***	TereScope 2000/4E1 TereScope 2000/4T1		TereScope2000/4E1 or TereScope2000/4T1 , Free Space 870m@30db/km and 3400m@3db/km (clear weather), 4E1 or 4T1 Link, G.703/G.704, visual alignment, Interface : 4 Universal connectors to be used for 75 Ohm (Coax) or 120 Ohm (STP). Power supply VS or V3*. RSM-SNMP Optional, Basic accessories kit supplied with the link: JAH-8, JMP and JITK..
TS8/E2/4E1/V* **TS8/E2/4T1/V***	TereScope 4000/4E1 TereScope 4000/4T1		TereScope4000/4E1 or TereScope4000/4T1 , Free Space 1090m@30db/km and 4800m@3db/km (clear weather), 4E1 or 4T1 Link, G.703/G.704, visual alignment, Interface : 4 Universal connectors to be used for 75 Ohm (Coax) or 120 Ohm (STP). RSM-SNMP Optional, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TS8/G/4E1/V* **TS8/G/4T1/V***	TereScope 5000/4E1 TereScope 5000/4T1		TereScope5000/4E1 or TereScope5000/4T1 , Free Space 1360m@30db/km and 6500m@3db/km (clear weather), 4E1 or 4T1 Link, G.703/G.704, visual alignment, Interface : 4 Universal connectors to be used for 75 Ohm (Coax) or 120 Ohm (STP). RSM-SNMP included,Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK
TereScope® 2 - TereScope® E1 or T1			
TS2/A/E1/V* **TS2/A/T1/V***	TereScope 702/E1 TereScope 702/T1	E1 T1	TereScope702/E1 or TereScope702/T1 (PhoneLight) , Optical Wireless 440m@30db/km and 1200m@3db/km (clear weather), E1/T1 Link, G.703/G.704, visual alignment, Interface RJ48. Power supply VS or V3*. RSM-SNMP Optional, Important Remark: This model can be powered via standard data cable (CAT 5, RJ48 Connector) - to be specified with order. Basic accessories kit supplied with the link: JMP.
TS2/C2/E1/V* **TS2/C2/T1/V***	TereScope 707/E1 TereScope 707/T1		TereScope707/E1 or TereScope707/T1, Optical Wireless 750m@30db/km and 2700m@3db/km (clear weather), E1/T1 Link, G.703/G.704, visual alignment, Interface RJ48. Power supply VS or V3*. RSM-SNMP Optional, Important Remark: This model can be powered via standard data cable (CAT 5, RJ48 Connector) - to be specified with order. Basic accessories kit supplied with the link: JMP.
TS2/D2/E1/V* **TS2/D2/T1/V***	TereScope 2000/E1 TereScope 2000/T1		TereScope2000/E1 or TereScope2000/T1, Free Space 1000m@30db/km and 4100m@3db/km (clear weather), E1/T1 Link, G.703/G.704, visual alignment, Interface : Universal connector to be used for 75 Ohm (Coax) or 120 Ohm (STP) . RSM-SNMP Optional, Power supply VS or V3*. Important Remark: This model can be powered via standard data cable (CAT 5) - to be specified with order. Basic accessories kit supplied with the link: JAH-8, JMP and JITK.
TS2/E2/E1/V* **TS2/E2/T1/V***	TereScope 4000/E1 TereScope 4000/T1		TereScope4000/E1 or TereScope4000/T1, Free Space 1170m@30db/km and 5200m@3db/km (clear weather), E1/T1 Link, G.703/G.704, visual alignment, Interface : Universal connector to be used for 75 Ohm (Coax) or 120 Ohm (STP). RSM-SNMP Optional, Removable Power supply, Power supply VS or V3*. Basic accessories kit supplied with the link: AD-5000, JMP-8 and JITK

TereScope®

Free Space Optics Solutions

Most Secure Wireless Transmission



Wireless Gigabit Revolutions

MRV- TS Brochure
Rev.1 05-06