# SensorTec
Canada

MIMO Link 2x2 Family

The MIMO Link 2x2 range of solutions comprises of a number of high-performance Fixed Broadband Wireless Access (FBWA) units, which operate in both LOS (line-of-sight) and NLOS (non-line-of-sight) environments, in both licensed and unlicensed frequency bands. Featuring highest performing hardware and operating system coupled with most innovative radio technology providing with best sensitivity, increased output power across all modulations and wide dynamic range, MIMO Link 2x2 represents a perfectly balanced solution for any type of Point-to-Point connectivity.

The MIMO Link 2x2 is a wireless Point-to-Point solution, which combines high-speed capability, up to 300 Mbps throughput, with a rich set of best-in-class features and benefits such as leading-edge radio protocols providing unrivalled spectral efficiency and wireless transmissions over distances in excess of 80 km.

SensorTec Wireless' diverse range of solutions enables Service Providers of all types to build higher capacity networks with even fewer network elements, thereby significantly reducing their overall CAPEX and subsequent OPEX throughout the life of their network.
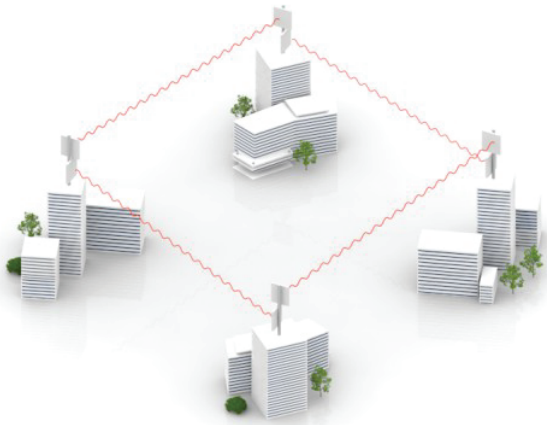
The MIMO 2x2 portfolio represents a unique proposition to all types of operators (e.g. WISP's, organisations of all sizes, government authorities, etc.) wishing to deliver Fast Ethernet data, voice and video services at ultra long ranges, whilst at the same time providing a wide set of networking features and maintaining strict QoS control. With their increased aggregate bit rates and improved coverage range, our base stations now allow operators to cater for more and higher capacity remote subscriber units than ever before, thus reducing capital expenditure on network infrastructure.

SensorTec Wireless' new MIMO 2x2 product family is an optimal solution for a diverse range of applications, from Wireless ISP's requiring multi-megabit capacity to corporates, from government authorities to mobile operators.

Key Features and Highlights
- Available in 4.9-6.05 GHz and 6.05-6.4 GHz frequency bands
- Multiple Input - Multiple Output (MIMO 2x2) innovative technology
- "Pay as you grow" software upgradeable capacity feature
- High-capacity - up to 280 Mbps net throughput
- 5/10/20/40 MHz channel widths
- Possible operational distances in excess of 80 km
- Unique plug & play out-of-box 5-6 GHz ultra-long backhaul solution
- Gigabit Ethernet port and flexible uplink/downlink reallocation
- LOS (line-of-sight) and NLOS (non-line-of-sight) deployments
- Optional Instant DFS feature allowing non-invasive background spectrum monitoring and seamless frequency channel change on channel congestion
- Advanced Quality-of-Service Support
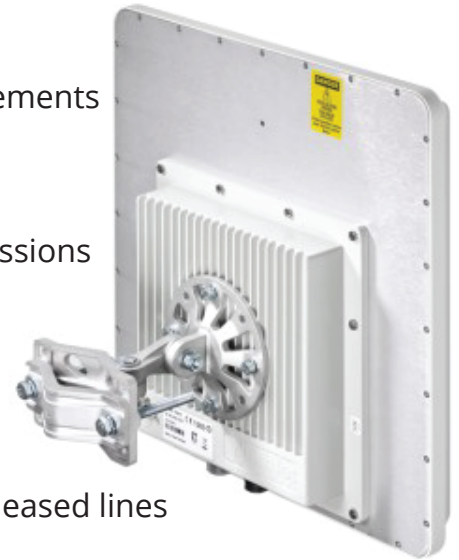- Reliable and robust design

MIMO 2x2 Technology
MIMO 2x2 stands for Multiple Input / Multiple Output innovative technology and it requires the use of two antennas at both the transmitter and receiver to improve communication performance

MIMO Link 2x2 Family

Solution Benefits

- Low entry cost and remote capacity upgrades
- Better ROI achieved through the use of wider channel sizing and unprecedented radio performance
- Seamless integration into existing infrastructures
- Huge savings on third-party networking equipment
- Extra ROI achieved through the provision of service levels agreements
- Low running costs for servicing and maintenance
- Flexible frequency planning and high spectral efficiency
- Unique interference mitigation capabilities
- Ultra-low latency and jitter, optimal for video and voice transmissions
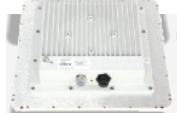
Applications

- GSM/3G/LTE High-capacity backhaul
- WISP infrastructure backhaul
- Building-to-building connectivity at Fast Ethernet speeds
- Redundant Cellular backhaul
- A cost-effective alternative for legacy microwave links or wired leased lines
- WISP Internet POP for remote areas
- NLOS backhauling using lower frequency bands
- Reliable backup for fiber lines, high-speed FSO or millimeterwave links

Equipment

Recommended applications	• High-capacity CCTV infrastructure backhaul • 4G/LTE/WiMAX BTS High-capacity backhaul • WISP infrastructure backhaul • WISP Internet POP for remote areas • Redundant Cellular backhaul • Reliable easy-to-install backhaul at Fast Ethernet speeds		• Reliable backup for fiber lines, high-speed FSO or millimeter- wave links • CCTV backhaul • A cost-effective alternative for legacy microwave links • Lightweight high spectral efficiency backhaul	
Product Family	MIMO Link 2x2 PRO		MIMO Link 2x2 LITE	
Model	**ST-PH5300i**	**ST-PH5300e**	**ST-LPM5300i**	**ST-LPM5300e**
Device description	High-capacity 280 Mbps Integrated Antenna Point-to-Point Backhaul	High-capacity 280 Mbps External Antenna Point-to-Point Backhaul	Medium –capacity lightweight Integrated 19, 21, 23, 24, 27 or 28 dBi Dual-polarization Antenna Point-to-Point Backhaul	Medium –capacity lightweight External Antenna Point-to-Point Backhaul
Performance	• 300 Mbps (up to 280 Mbps net throughput)	• 300 Mbps (up to 280 Mbps net throughput)	• 8 Mbps (up to 8 Mbps net) • 50 Mbps (up to 50 Mbps net) • 300 Mbps (up to 180 Mbps net) • License upgradeable	• 8 Mbps (up to 8 Mbps net) • 50 Mbps (up to 50 Mbps net) 300 Mbps (up to 180 Mbps net) • License upgradeable
Frequency Bands/Antennae	• 4.9 – 6.0 GHz / Integrated 23 or 28 dBi Dual-polarization Antenna • 6.0 – 6.4 GHz / Integrated 24 or 27 dBi Dual-polarization Antenna	• 4.9 – 6.0 GHz / Connectorised Antenna (2 x N-type connectors) • 6.0 – 6.4 GHz / Connectorised Antenna (2 x N-type connectors)	• 4.9 – 6.0 GHz / Integrated 19, 21, 23 or 28 dBi Dual-polarization Antenna • 6.0 – 6.4 GHz / Integrated 19, 24 or 27 dBi Dual-polarization Antenna	• 4.9 – 6.0 GHz / Connectorised (2 x N-type connectors) • 6.0 – 6.4 GHz / Connectorised (2 x N-type connectors)
Distance	• 23 and 24 dBi antenna recommended range: up to 10-20 km maximal range: in excess of 30 km • 27 and 28 dBi antenna recommended range: up to 15-50 km maximal range: in excess of 60 km	• recommended range: up to 80 km (with external high-gain antennas) • maximal range: in excess of 100 km	• 19 dBi antenna: short-to-middle range (up to 5-10 km) • 21 dBi antenna: middle range (up to 7-12 km) • 23 and 24 dBi antenna: middle-to-long range (up to 10-15 km) • 27 and 28 dBi antenna: long range (up to 15-30 km)	• Long range (up to 60 km with high-gain external antenna)
Radio	• Radio technology: MIMO 2x2 with OFDM 64/128 • Modulation types: BPSK ½ to QAM64 5/6 • Transmit power: up to 23 dBm • Receiver sensitivity: -67..-97 dBm • Channel bandwidth: 5/10/20/40 MHz • Instant DFS (optional)	• Radio technology: MIMO 2x2 with OFDM 64/128 • Modulation types: BPSK ½ to QAM64 5/6 • Transmit power: up to 23 dBm • Receiver sensitivity: -67..-97 dBm • Channel bandwidth: 5/10/20/40 MHz • Instant DFS (optional)	• Radio technology: MIMO 2x2 with OFDM 64/128 • Modulation types: BPSK ½ to QAM64 5/6 • Transmit power: Up to 18 or 23 dBm (4.9-6.0 GHz models) Up to 23 dBm (6.0-6.4 GHz models) • Receiver sensitivity: -67..-97 dBm • Channel bandwidth: 5/10/20/40 MHz	• Radio technology: MIMO 2x2 with OFDM 64/128 • Modulation types: BPSK ½ to QAM64 5/6 • Transmit power: Up to 18 or 23 dBm (4.9-6.0 GHz models) Up to 23 dBm (6.0-6.4 GHz models) • Receiver sensitivity: -67..-97 dBm • Channel bandwidth: 5/10/20/40 MHz

Wired Interfaces	• Gigabit Ethernet port (10/100/1000 Base-T) RJ-45 connector • Serial port (RS-232)	• Gigabit Ethernet port (10/100/1000 Base-T) RJ-45 connector • Serial port (RS-232)	Smn 19 dBi • 1 x Fast Ethernet (10/100 Base-T) RJ-45 connector Smn 21..28 dBi • 2x Fast Ethernet (10/100 Base-T) PoE output at the second Ethernet port RJ-45 connector	• 2x Fast Ethernet (10/100 Base-T) PoE output at the second Ethernet port RJ-45 connector
Power Consumption	• Consumption: Up to 12 Watts • Power options: 110-240 VAC @ 50/60 Hz ±43..56 VDC	• Consumption: Up to 12 Watts • Power options: 110-240 VAC @ 50/60 Hz ±43..56 VDC	• Consumption: Up to 7 Watts • Power options: 110-240 VAC @ 50/60 Hz +9..56 VDC	• Consumption: Up to 7 Watts • Power options: 110-240 VAC @ 50/60 Hz +9..56 VDC
Form factor and Dimensions	• Outdoor Unit (ODU): **27 or 28 dBi antenna** 600 x 600 x 75 mm, 6.8 kg **23 dBi antenna** 370 x 370 x 90 mm, 3.5 kg **24 dBi antenna** 305 x 305 x 60 mm, 2,3 kg • Indoor Unit (IDU-BS-G) 124 x 72 x 38 mm 0.3 kg	• Outdoor Unit (ODU): **External antenna** 240 x 240 x 51 mm, 2.3 kg • Indoor Unit (IDU-BS-G) 124 x 72 x 38 mm 0.3 kg	• Outdoor Unit (ODU): **27 or 28 dBi antenna** 600 x 600 x 75 mm, 6.1 kg **23 dBi antenna** 305 x 305 x 73 mm, 2.0 kg **21 or 24 dBi antenna** 305 x 305 x 73 mm, 2.0 kg **19 dBi antenna** 207 x 207 x 67 mm, 1.0 kg • Indoor Unit (IDU-CPE) 85 x 76 x 36 mm 0.15 kg	• Outdoor Unit (ODU): **External antenna** 240 x 240 x 51 mm ,1.6 kg • Indoor Unit (IDU-CPE) 85 x 76 x 36 mm 0.15 kg

TECHNICAL SPECIFICATION

RADIO
* **Voice/RTP Aware Superpacketing**
- to minimize jitter and latency for multimedia
  applications
* **DFS**
- intelligent search for a cleanest channel and
interference avoidance
- radar detection (depending on regulatory
domain)
- continuous background spectrum
 monitoring (for Instant DFS enabled units
only)
- seamless channel change in case of
congestion or radar detection (for Instant DFS
enabled units only)
* **Automatic Bitrate Control**
- to ensure a 100% stable link irrelevant of
  changes in external conditions
* **Automatic Transmit Power Control**
- to track and keep optimal input signal level
to maximize performance for each link and
reduce overall interference within a given
transmit
power and EIRP limitations
* **Automatic Distance Learning**
- to optimize performance for any link
distances from dozens of meters to 100 km
and above
* **Channel Time Adjustment**
- to improve performance on heavily loaded
links
* **Spectrum Analyzer mode**
- interference detection
- non-invasive spectrum analysis (for Instant
DFS enabled units only)
* **Channel testing tools**
- channel performance measurement
- advanced diagnostics

MANAGEMENT FEATURES
* **Web-interface**
- basic settings
- channel diagnostics: spectrum analysis,
  antenna alignment, channel throughput
  measurement
- unit and RF links monitoring
- maintenance: firmware upgrade, license
  and configuration import/export
- tech support diagnostic reports generation
- command-line access
* **Command-line interface for in-depth
configuration and diagnostics accessible
via:**
- secure shell (SSH)
- telnet
- serial port
- remote shell
* **SNMPv1 / SNMPv3 support
(MIB II, private MIB)**
* **Configurable SNMP Traps**

QUALITY-OF-SERVICE
**With many QoS permutations, QoS
implementation works transparently in the
network based on IEEE802.1p standard as
well as ToS/DiffServ, guaranteeing optimal
performance under any load conditions and
lowest jitter/delays for priority traffic.
Quality-of-Service features:**
* **16 priority queues**
* **IEEE 802.1p support**
* **IP TOS / DiffServ support**
* **Full voice support**
* **Traffic limiting**
(absolute, relative, mixed)
* **Traffic redirection**

NETWORKING
* **Ethernet-over-IP tunneling**
* **ARP protocol support**
* **MAC/IP filtering**
* **Full-fledged 2nd layer switch:**
- Transparent transport for any type
of Ethernet traffic including MPLS,
stacked VLANs, etc.
- Multiple switching groups
- Full VLAN support including Q-in-Q
(IEEE 802.1q and 802.1ad)
- STP/rSTP support
- IGMP Snooping with Querrier mode
- Trunk groups support
* **RIPv2 / OSPFv2 /static routing**
* **Tunneling**
(Ethernet-over-IP, IP-over-IP)
* **L2/L3 Firewall**
* **NAT(multipool, H.323-aware)**
* **DHCP client/server/relay**

MAC
* **Dynamic adaptive Polling**
- Centralized marker grant mode
- Dynamically takes into account
  channel activity
- Permanent channel testing
* **Pseudo-radio Interface**
- unique SensorTec Wireless feature to
  join SensorTec Wireless networks via
  3rd party equipment (Wired Ethernet
segments, IP clouds)
* **Automatic over-the-air firmware
  upgrade**

STANDARD COMPLIANCE
* **Radio**
- EN 301 893 v.1.5.1
- EN 302 502 v.1.2.1
- FCC part 15.247
* **EMC**
- EN 301 489-1
- EN 301 489-17
- FCC Part 15 Class B
* **Safety**
- EN 60 950-1:2006
* **RoHS**
- Directive 2002/95/EC

SECURITY FEATURES
* **Storm / flood protection**
* **Password protection**
* **Secure command-line access via SSH
protocol**

ENVIRONMENTAL
* **Outdoor Units:**
-40..+60C, 100% humidity, condensing
* **Indoor Unit:**
0..+40C, 95% humidity, non-condensing