



Technical Specifications

This appendix lists the technical specifications for the following WipLL units:

- WipLL Base Station equipment:
 - Base Station Radio (BSR)
 - Point-to-Point Radio (PPR)
 - Base Station Distribution Unit (BSDU)
 - Base Station Power Supply (BSPS)
 - GPS antenna
- WipLL Customer premises equipment:
 - Subscriber Premises Radio (SPR)
 - Subscriber Data Adapter (SDA)
 - SDA-1
 - SDA-4H
 - SDA-4S models
 - Indoor Data Radio (IDR)

C.1. Base Station WipLL Equipment

The following sub-sections list the specifications of the following WipLL Base Station equipment:

- Base Station Radio (BSR)
- Point-to-Point Radio (PPR)
- Base Station Distribution Unit (BSDU)
- Base Station Power Supply (BSPS)

C.1.1. Base Station Radio (BSR)

Table C-1: BSR and MAC Specifications

Parameter	Value	Comment
Operating frequency range	• 2.4 GHz • 3.x GHz, MMDS, 2.8 • 5.8 GHz • 900 MHz • 700 MHz	• ISM band • Licensed band • Unlicensed • Unlicensed • Licensed *Other ranges available for trial
Spectrum spreading method	Frequency hopping	Per ETSI EN301 253
Duplex method	• Time Division Duplex (TDD): 2.4 GHz, 2.8 GHz, 3.x GHz, MMDS, 900 MHz, 700 MHz, and 5.8 GHz • Frequency Division Duplex (FDD): 3.x GHz	
Transmit bit rates	Up to 4 Mbps	BER and distance dependent
Channel spacing	1 MHz	For 3.5 GHz the channel spacing can be 1 MHz or 1.75 MHz
Output power from the BSR	Up to 27 dBm (configurable)	Depending on local regulations, maximum output power can be configured at the factory
Modulation method	8-level CPFSK	
Channel access method	PPMA / Adaptive TDMA	
Protocol efficiency	Up to 80%	For large data packets
Number of SPR/IDR per BSR	Up to 126	

Table C-2: BSR EMC and Radio Standards Compliance

Parameter	Value
Radio Standards Compliance	- ETSI EN 300 328-1 - ETSI EN 301 253 - FCC part 15 - RSS139 - Telec
EMC	- ETSI ETS 300 826 - ETSI EN 300 385 - ETSI EN 300 386-2 - ETSI ETS 300 132-2 - FCC part 15

Table C-3: BSR Agency Certification

Parameter	Value
Emissions / Immunity	EN 300 339 EN 300 386-2 ETS 300 328
Safety	EN / IEC 60950
Environmental	ETS 300 019-2-x

Table C-4: BSR Network Specifications

Parameter	Value	Comment
Filtering Rate	10,500 frames/sec	At 64 byte packets
Forwarding Rate	1,300 frames/sec	At 64 byte packets
Routing table length	200 networks, including subnets	

Table C-5: BSR Power Requirements

Parameter	Value	Comment
Voltage	48 VDC nominal	Voltage is received from the BSDU or SDA, depending on base station setup
• Minimum:	• 30 VDC	
• Maximum:	• 55 VDC	
Maximum Amperes:	500 mA	

Table C-6: BSR Environmental Conditions

Parameter	Value	Comment
Operating temperature of outdoor units (BSR and SPR)	-30°C to +60°C	Optional range of -40°C to +70°C
Storage temperature	-40°C to +80°C	

Table C-7: BSR Network Interface

Parameter	Value	Comment
Ethernet Network	UTP EIA/TIA	Category 5
Standards Compliance	ANSI/IEEE 802.3 and ISO/IEC 8802-3 10Base-T compliant	
Serial Port	RS-232	

Table C-8: BSR Physical Dimensions

Parameter	Value	Comment
Height	400 mm (15.74 inches)	Excluding mounting kit
Width	317 mm (12.48 inches)	
Depth	65.5 mm (2.58 inches)	
Weight	4.7 kg	

C.1.2. Point-to-Point Radio (PPR)

Table C-9: PPR Radio Specifications

Parameter	Value
Operating frequency bands	• 2,400 to 2,500 MHz • 3,400 to 3,800 MHz • 5,725 to 5,875 MHz
Duplex method	• Time Division Duplex (TDD) for all bands • Frequency Division Duplex (FDD) for 3.4 to 3.8 GHz
Radio Technology	FH-CDMA
Multiple Access Method	PPMA
Output power	27 dBm
Antenna type (built-in) • PPR • SPR	• 18 dBi / 15 dBi • 18 dBi / 15 dBi
Sub-Channel Spacing	1 MHz
Modulation	Multilevel (2, 4, or 8) CPFSK
Receiver Sensitivity (BER 1E-6 at 2/4/8 FSK)	-90/ -83/ -75 dBm
Throughput	Up to 4 Mbps per PPR-SPR link
Radio Standards Compliance	• ETSI EN 300 328-1 • ETSI EN 301 253 • FCC part 15 • RSS139 • Telec
EMC	• ETSI ETS 300 826 • ETSI EN 300 385 • ETSI EN 300 386-2 • ETSI ETS 300 132-2 • FCC part 15

C.1.3. Base Station Distribution Unit (BSDU)

Table C-10: BSDU Network Specifications

Parameter	Value
Filtering Rate	105,000 Frames / sec
Forwarding Rate	62,500 Frames / sec

Table C-11: BSDU Power Requirements

Parameter	Value
Voltage	48VDC nominal
Power consumption	Maximum 300W (including the feeding of 6 × BSRs)

Table C-12: BSDU Environmental Conditions

Parameter	Value
Operating Temperature	0°C to +50°C
Storage Temperature	-40°C to +80°C

Table C-13: BSDU Network Interface

Parameter	Value	Comment
Ethernet Network	100/10Base-T: UTP EIA/TIA	Category 5
Standards Compliance	ANSI/IEEE 802.3, ISO/IEC 8802-3 10/100 Base-T compliant	
Serial Port	RS-232	

Table C-14: BSDU Physical Dimensions

Parameter	Value
Height	4.32 cm
Width	48.26 cm
Depth	22.86 cm
Weight	2.9 kg

C.1.4. Base Station Power Supply (BSPS)

Table C-15: BSPS Rectifier Specifications

	Parameter	Value
Input	Voltage	90VAC to 270VAC
	Current (nominal)	3.2A @ 230V / 4.3A @ 115V
	Frequency	47Hz to 63Hz
	Power factor (nominal line/load)	Greater or equal to 0.993
Output	Voltage (default)	53.5VDC
	Regulation (line & load)	±0.4%
	Adjustable range	47 to 58 VDC
	Current	12A @ 54V
	Ripple & noise	50mVp-p
	Efficiency (nominal load)	85% @ 230V / 82% @ 115V
	Overload current	<12A
	Over-voltage protection	60 VDC
	Over-temperature protection (measured on case, upper panel corner)	80±5°C rectifier stops 72±5°C rectifier recovers
	Walk-in time	< 0.5 sec
	Hold-up time	40 ms
General	Withstand voltage (1 min)	4230VDC INPUT/OUTPUT 2120VDC INPUT/GND 1700VDC OUTPUT/GND
	Working temperature	-10 to 45°C
	Storage temperature	-50 to 80°C
	Dimensions (mm)	235 x 150 x 50 (L x W x H)
	Weight	1100g
	EMC	Refer to system specifications
	Safety	According to: IEC950

Table C-16: BSPS DC Distribution Specifications

	Parameter	Value
Input	Voltage	90VAC to 270VAC
	Current (at full load) N =Number of rectifier modules	• N*3.2A @ 230V • N*4.3A @ 115V
	Frequency	47 Hz to 63 Hz
	Power factor (at full load)	Greater or equal to 0.993
	Voltage (programmable)	42 to 60VDC $\pm$ 0.5VDC
Output	Default float and boost voltage	54 and 57VDC respectively
	Regulation (line, load, sharing)	$\pm$ 1%
	Current	N*12A (48A max.)
	Psophometric noise	-52 dBm (over 600 &)
	Ripple & noise	50mVp-p
	Efficiency (nominal load)	85% @ 230V / 82% @ 115V
	Overload current	< N*12A
	Over-voltage protection	60VDC
	Walk-in time	< 1 sec
	Hold-up time	40 ms
	Output current indication	10 LED's bar-graph
	Active current sharing	$\pm$ 10% accuracy at full load
	Withstand voltage (1 min)	2120VDC INPUT/GND
General	Working temperature	-10 , 45°C
	Storage temperature	-50 , 80°C
	Dimensions (19" X 3U)	Depth is 320mm W/O terminals, 360mm with terminals
	Weight	13 kg (main unit + 3 rectifiers)
	RS232 Communication	9600 bps, no-parity, 1 stop-bit

	Parameter	Value
	EMC	According to: • EN300-386-2 SUB 7.2.3 • EN55022 class B • IEC1000-4-2 • IEC1000-4-3 • IEC1000-4-4 • IEC1000-4-5 • IEC1000-4-6 • IEC1000-4-11 • IEC1000-3-2 • IEC1000-3-3
	Safety	According to: IEC950
	Maximum current withstand	2x70A
LVLD (optional)	Trip voltage level	Disconnect default: 43± 0.5 VDC, user programmable Re-connect: with AC recovery

C.1.5. GPS antenna

Table C-17: SPR Power Requirements

Parameter	Value	Comment
Voltage Input	36 VDC	Supplied by WipLL's BSDU
Consumption	1.8W	

Table C-18: Environmental Considerations

Parameter	Value	Comment
Operating temperature	-30°C to +75°C	

Table C-19: GPS General

Parameter	Value	Comment
Input	DGPS (Differential GPS)	
Output	1 pulse per second	
Standards Compliance	MIL-STD 810E	
Interface standard	RS-422	

Table C-20: GPS Dimensions

Parameter	Value	Comment
Diameter	115 mm	
Height	90 mm	

C.2. Customer Premises WipLL Equipment

The following sub-sections list the specifications of the following WipLL CPE equipment:

- Subscriber Premises Radio (SPR)
- Subscriber Data Adapter (SDA)
- Indoor Data Radio (IDR)

C.2.1. Subscriber Premises Radio (SPR)

Table C-21: SPR and MAC Specifications

Parameter	Value	Comment
Operating frequency	2.4 GHz 3.x GHz, MMDS, 2.8 5.8 GHz 900 MHz 700 MHz	- ISM band - Licensed band - Unlicensed - Unlicensed - Licensed
Spectrum spreading method	Frequency hopping	Per ETSI EN 301 253
Duplexing Method	- Time Division Duplex (TDD): 2.4 GHz, 2.8 GHz, 3.x GHz, MMDS, 900 MHz, 700 MHz, and 5.8 GHz - Frequency Division Duplex (FDD): 3.x GHz	
Transmit Bit Rates	Up to 4 Mbps	BER and distance dependent
Channel spacing	1 MHz 1 MHz or 1.75 MHz when operating in the 3.5 GHz band	
Output power from the radio	Up to 27 dBm (configurable)	Depending on local regulations. Maximum power output can be set at the factory.

Parameter	Value	Comment
Modulation method	8-level CPFSK	
Channel access method	PPMA / Adaptive TDMA	
Protocol efficiency	Up to 80%	For large data packets

Table C-22: SPR EMC and Radio Standards Compliance

Parameter	Value
Radio Standards Compliance	- ETSI EN 300 328-1 - ETSI EN 301 253 - FCC part 15 - RSS139 - Telec
EMC	- ETSI ETS 300 826 - ETSI EN 300 385 - ETSI EN 300 386-2 - ETSI ETS 300 132-2 - FCC part 15

Table C-23: SPR Agency Certification

Parameter	Value
Emissions / Immunity	EN 300 339, EN 300 386-2, ETS 300 328
Safety	EN/IEC 60950
Environmental	ETS 300 019-2-x

Table C-24: SPR Network Specifications

Parameter	Value	Comment
Filtering rate	10,500 frames / sec	At 64 bytes
Forwarding rate	1,300 frames / sec	At 64 bytes
Routing table length	16	

Table C-25: SPR Power Requirements

Parameter	Value	Comment
- Voltage - Minimum - Maximum	48VDC nominal 30VDC 55VDC	Power supplied by the SDA
Consumption	Maximum	500 mA

Table C-26: Environmental Considerations

Parameter	Value
Operating temperature	-30°C to +60°C
Storage temperature	-40°C to +80°C

Table C-27: Network Interface

Parameter	Value	Comment
Ethernet Network	UTP EIA / TIA	Category 5
Standards Compliance	ANSI/IEEE 802.3 and ISO/IEC 8802-3; 10BaseT compliant	
Serial Port	RS-232	

Table C-28: SPR Physical Dimensions (without High-Gain Antenna)

Parameter	Value	Comment
Height	311 mm (12.24 inches)	Excluding mounting kit
Width	244 mm (9.6 inches)	
Depth	65.5 mm (2.57 inches)	
Weight	2.5 kg	

Table C-29: SPR Physical Dimensions (with High-Gain Antenna)

Parameter	Value	Comment
Height	400 mm (15.74 inches)	Excluding mounting kit
Width	317 mm (12.48 inches)	
Depth	65.5 mm (2.57 inches)	
Weight	4.7 kg	



Note: The SPR cable and connector are the same as the BSR.

C.2.2. Subscriber Data Adapter (SDA)

C.2.2.1. SDA-1

Table C-30: SDA-1 Physical Dimensions

Parameter	Value
Height	200 mm
Width	150 mm
Depth	40 mm
Weight	47 kg

Table C-31: SDA Power Requirements

Parameter	Value
Output Voltage	-48VDC nominal
Power supply	110-240 VAC, 50/60Hz, 0.3-0.7A

Table C-32: SDA-1 Environmental Considerations

Parameter	Value
Operating temperature	0°C to +50°C

Table C-33: SDA-1 Network Interfaces

Parameter	Value
Data from SPR/BSR	DB15
Ethernet	RJ45 socket for a PC interface
Power	AC power connector

C.2.2.2. SDA-4H

Table C-34: SDA-4-H Physical Dimensions

Parameter	Value
Height	200mm
Width	150mm
Depth	40mm
Weight	53 kg

Table C-35: SDA-4H Power Requirements

Parameter	Value
Output Voltage	-48VDC nominal
Power supply	110-240 VAC, 50/60Hz, 0.3-0.7A

Table C-36: SDA-4H Environmental Considerations

Parameter	Value
Operating temperature	0°C to +50°C

Table C-37: SDA-4H Network Interfaces

Parameter	Value
Data from SPR/BSR	DB15
Ethernet	Three RJ45 socket for a PC interface; one RJ-45 for cross over connection
Power	AC power connector

C.2.2.3. SDA-4S Models

Table C-38: SDA-4S Physical Dimensions

Parameter	Value
Height	200 mm (7.87 inches)
Width	150 mm (5.9 inches)
Depth	40 mm (1.57 inches)
Weight	53 kg

Table C-39: SDA-4S Power Requirements

Parameter	Value
Output Voltage	-48VDC nominal
Power supply	110-240 VAC, 50/60 Hz, 0.3-0.7A

Table C-40: SDA-4S Environmental Considerations

Parameter	Value
Operating temperature	0°C to +50°C

Table C-41: SDA-4S Network Interfaces

Parameter	Value
Data from SPR/BSR	15-pin D-type
Ethernet	Four 8-pin RJ-45 10/100BaseT sockets for PC interface. These ports support 10/100 Mbps (Auto Negotiation), and MDI/MDI-X automatic crossover
Power	AC power connector

C.2.3. Indoor Data Radio (IDR)

Table C-42: IDR Radio and MAC Specifications

Parameter	Value	Comment
Operating frequency	• 2.4 GHz • 3.45 GHz • 3.5 GHz • 900 MHz	
Spectrum spreading method	Frequency hopping	(Per ETSI ETS 300 328) ARIB-STD-T66
Duplex Method	• Time Division Duplex (TDD) at 2.4 GHz and 900 MHz • Frequency Division Duplex (FDD) at 3.5 GHz and 3.45 GHz	
Transmit Bit Rates	Up to 4 Mbps	Depending on BER
Channel spacing	1 MHz	
Output power from the radio	Up to 27 dBm, configurable at 2.4 GHz	Depending on local regulations. Maximum power output can be set at the factory.
Channel access method	PPMA	
Protocol efficiency	Up to 80%	At BER = 10^{-5} , depending on the application

Table C-43: IDR EMC and Radio Standards Compliance

Parameter	Value
Radio Standards Compliance	• ETSI EN 300 328-1 • ETSI EN 301 253 • FCC part 15 • RSS139 • Telec
EMC	• ETSI ETS 300 826 • ETSI EN 300 385 • ETSI EN 300 386-2 • ETSI ETS 300 132-2 • FCC part 15

Table C-44: IDR Agency Certification

Parameter	Value
Emissions / Immunity	• FCC Class B • ARIB-STD-T66 • ETSI 300 386-2
Safety	EN/IEC 60950
Environmental	ETS 300 019-2-x

Table C-45: IDR Network Specifications

Parameter	Value	Comment
Filtering rate	10,500 frames/sec	At 64 bytes
Forwarding rate	1,300 frames/sec	At 64 bytes

Table C-46: IDR Power Requirements

Parameter	Value
External Power Supply Voltage	• Minimum: 100 VAC • Maximum: 240VAC
Operating Frequency Range	50 to 60 Hz
Maximum Power consumption	Less than 15W

Table C-47: IDR Environmental Considerations

Parameter	Value	Comment
Operating temperature	0-50°C	
Operating Humidity	+30C° 93%	Maximum humidity
Storage temperature	-40 – 70°C	

Table C-48: IDR Network Interface

Parameter	Value	Comment
Ethernet Network	UTP EIA / TIA	Category 5
Standards Compliance	ANSI/IEEE 802.3 and ISO/IEC 8802-3 10Base-T compliant	
Serial Port	RJ-11	

Table C-49: IDR Physical Dimensions

Parameter	Value	Comment
Weight	1,430 g	
Dimensions (H x W x D)	155 mm (6.1 inches) x 233 mm (9.17 inches) x 74.5 mm (2.93 inches) 120.5 mm (4.74 inches) x 61mm (2.4 inches) x 35 mm (1.37 inches)	- IDR with built-in antenna - IDR with an external antenna Note: Dimensions exclude the external power adapter.

Table C-8: IDR Pole Mounting Dimensions

Parameter	Value
Minimum pole diameter	35 mm (1.37 inches)
Maximum pole diameter	50 mm (1.97 inches)