CONNECTIVITY

K20 Edge Repeater

RPK20E868/ RPK20E915/ RPK20E923

The K20 Edge Repeater is a key element of Worldsensing's LoRa Tree network topology. Extend the communication range of your deployments to gain significant network range, especially underground. The repeater retransmits data from its associated nodes to the main gateway. Data can travel along multiple repeaters in hops before arriving at the main gateway, thus gaining significant longer range.

Leverage the K20 Edge Repeater and LoRa Tree network to tackle coverage challenges in complex geographical topologies, such as underground environments, tunnels or inside dam galleries. This monitoring solution can achieve up to 10 km of communication range in three hops with minimum latency.
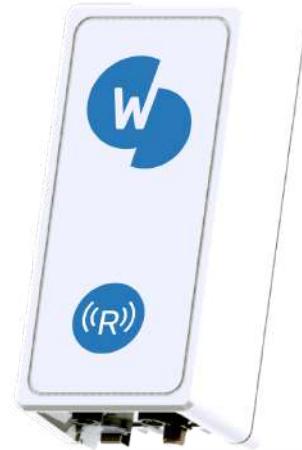
The K20 Edge Repeater has been designed to withstand harsh conditions including humidity, dust and vibration. Requiring minimum power consumption, the repeater is powered through PoE or USB C.

The repeater works with Worldsensing's Connectivity Management Tool (CMT), the CMT Edge to provide a seamless data flow from the sensors to your operational systems. It comes with a dedicated user interface that allows you to easily configure your downstream devices and other network parameters.

FEATURES

Carrier grade casing (IP67) for industrial use

Supported unlicensed bands : 863-874.4MHz (EMEA, India), 902-928MHz (North America), 915-928MHz (APAC, Latin America)

8ch RX (125 kHz, multi Spreading Factor)

Powered by PoE (Injector, switch), both Mode A and Mode B (802.3af specifications), ±48VDC through RJ45 (isolated power), USB Type C

External waterproof connectors (RJ45, USB Type C) eliminating the need to open the casing during installation.

Easy-to-install mounting kit

USB Type C connector for direct PC connection using USB cable

Compatible with all Worldsensing Edge Devices[1]

Seamless communication between edge device and edge gateway through the repeater

ADVANTAGES

Under ideal conditions, up to 10 km range with 3 hops. Each hop can achieve up to 150 m to 3 km radio coverage.

Tree topology allows for a single gateway to manage hundredths of devices under one network.

Repeaters may be arranged in series to obtain a 10 km communication range.

Customer support from experts in IoT remote monitoring.

Pioneering company in IoT, more than 10 years experience in geotechnical, structural and geospatial monitoring in the mining industry.

[1] Some communication performance may be lost for the Event Detection Solution using LoRa Tree networks.

APPLICATIONS

Underground mining, geotechnical and structural monitoring
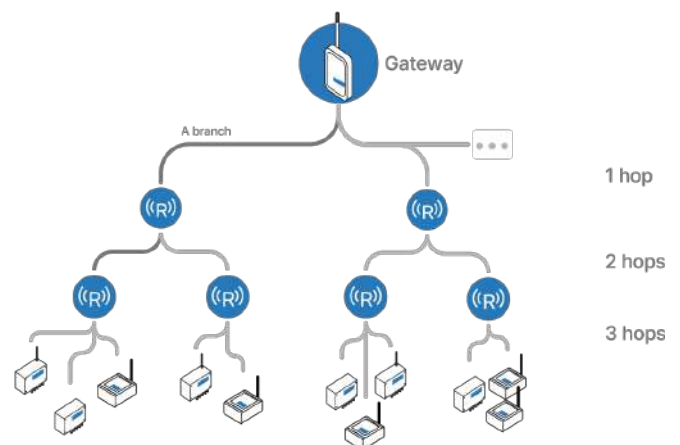
Tunnels and sewers

Galleries in concrete dams

Fig. 1: sample LoRa Tree network topology with four branches and three hops.

TECHNICAL SPECIFICATIONS

RADIO AND NETWORK SPECIFICATIONS

Radio Band	ISM Sub 1 GHz	
Sensitivity	Node to Repeater/ Gateway link	Repeater to Repeater/ Gateway Link
	Down to -137 dBm (SF11)	Down to -127 dBm (SF7)
Antenna[1]	Integrated internal antennas GPS, 4G, LoRa (peak gain=2,6dBi)	
Maximum distance between hops	150 m to 3 km / 0.1 mi to 1.83 mi	
Maximum number of hops	8 hops[2]	
Network range	Up to 10 km/6.21 mi with 3 hops	
Default Network Capacity	Message rate	3.125 messages/min
	Succesful transmission probability[3]	> 99.7% µ ± 3σ
	Sample rate	Maximum devices[5]
	5 min 30 min 1 h	15 93 187
Alternative Network Capacity[3]	Message rate	8 messages/min
	Succesful transmission probabilty[4]	> 98.758% µ ± 2.5σ
	Sample rate	Maximum devices[5]
	5 min 30 min 1 h	40 240 480

[1] It is highly reccomended to use an external antenna for the K20 Repeater in underground deployments.

[2] Downlink transmission latency can be increased in configurations with more than 5 hops.

[3] Higher network capacity available depending on the site conditions. Contact Worldsensing for more information.

[4] The successful transmission percentage has been estimated by determining the message loss due to inefficiencies of the LoRa Tree network considering the above load and 8 hops. Other reasons for message loss, such as a poor radio link, are not included.

[5] For the digital dataloggers, limits can be different as every sample can generate more than one radio message. Consider the number of radio messages to size the network in this case.

HARDWARE

Weight (excluding antenna)	265 x 165 x 100 mm 10.43 x 6.50 x 3.94 in
Size (Including mounting kit)	1.4 kg / 3.08 lb
Weather protection	IP67
Material	Aluminum (back), polycarbonate (front), Stainless steel (mounting kit)
Operating range	-40° to 60° C / -40° to 140° F

SOFTWARE AND FIRMWARE

Firmware	Worldsensing Edge Repeater firmware
Data and network management	Worldsensing CMT Edge v2.7.2 onwards
Configuration/firmware updates	Through web user interface via local access
Mobile App	Node configuration Offline coverage test feature

NETWORK MONITORING

Repeater Level	Statistical data collection about the radio network for troubleshooting
CMT Edge Level	• Real-time availability status (on/off) • Uptime • Power input • Health parameters

POWER REQUIREMENTS

Power source	• PoE both mode A and mode B (802.3af specifications) • 5V through USB C • PoE injector for indoor use included in the kit
Mean power consumption	4.5 W

INTERFACES

Leds	GREEN - power RED - system status
Peripherals	UBS Type C Port
Buttons	Multifunction button for On/Off/Reset

ACCESSORIES

EXTERNAL ANTENNA (RECOMMENDED)	
LS-ACC-SUPGW-01	Optional vertical omni-directional outdoor antenna kit, 3 dBi, 868 MHz, 30 cm length
LS-ACC-SUPGW-03	Optional vertical omni-directional outdoor antenna kit, 3 dBi, 915/923 MHz, 30 cm length
LS-ACC-SUPGW-02	Optional vertical omni-directional outdoor antenna kit, 6dBi, 915/923 MHz, 110 cm length
LS-ACC-ANTGW-01	Vertical omni-directional outdoor antenna, 3 dBi, 868 MHz, 30 cm length
LS-ACC-ANTGW-03	Vertical omni-directional outdoor antenna, 3 dBi, 915/923 MHz, 30 cm length
SURGE PROTECTION	
LS-ACC-LPANT-2	Loadsensing gateway lightning antenna protection Coaxial surge protector
LS-ACC-LPETH	Loadsensing gateway lightning Ethernet protection PoE surge protector
POWER SUPPLY	
LS-ACC-SC1248	12V in 48V out PoE, Solar Charge Controller. Dual input
LS-ACC-USBCGW	Converter kit to power the K20 GW through USB C directly from a photovoltaic system (12V IN -> 5V OUT). Includes a USB cable A male to C male, length: 3 m, a cable gland and an indoor DC-DC converter (IN:9-36 VDC, OUT:5.1 VDC)

PRODUCT ORDER REFERENCES

K20 EDGE REPEATER REFERENCES	
RPK20E868HW RPK20E868SW	K20 Edge repeater. 863-874.4MHz (according to device capabilities). EMEA, India.
RPK20E923HW RPK20E923SW	K20 Edge repeater. 915-928 MHz (according to device capabilities). APAC, Latin America.
RPK20E915HW[6] RPK20E915SW	K20 Edge repeater. 902-915 MHz (according to device capabilities). North America.

[6] Only compatible with the 4G Rugged Gateway Edge 915R. See data sheet for details.

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