# JNET1 GW Data Sheet

Indoor Gateway

Outdoor Gateway

JNET1 Gateway (Group Controller) functions as a point of presence (POP), bridging the JNET1 Wireless network with the IP domain. The gateway aggregates and conveys all its subtree nodes data towards and from the Lighting Management System (LMS).

The JNET1 network is established starting from the gateway which communicates with in-proximity nodes, creating a source routing tree topology.

## Features

- Single gateway manages up to 1000 nodes (other GWs cover only app. 200 nodes).
- Covers up to 10 km (6.3 mi) in open air and up to 8 km (5 mi) in dense urban areas.
- Communicates via RJ-45 wired IP or via a cellular modem/network.
- Deployed in diverse forms:

1. **Indoor** – where internet access is available.
   - **Connectors:**
     - **Power in:** Standard 5V/0.5A USB Power adapter
     - **Ethernet:** RJ45 Cable
     - **Debug:** USB Debug Port
2. **Outdoor** – installed inside an ebclosure on a pole/wall, using SIM/Cellular modem to provide two-way communication to the wireless and controller nodes' data.

## Benefits

- Few gateways may support large deployments – large territorial coverage per gateway
- Node roaming between the JNET1 gateways prevents a faulty gateway from being a "single point of failure", ensuring continuous performance even under difficult conditions.
- Distributes OTA software updates seamlessly to all subtree nodes.



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# Group Controller – JNET1 Gateway

## Specifications

**Product Data**

| | |
|---|---|
| Product Segment: | City & Infrastructure |
| Product Type: | Streets & Roads |
| Product Family: | JNET1 |

| COMMUNICATION | |
|---|---|
| Frequency ranges | 433.05-434.79 MHz<br>902-928 MHz |
| Data rate | 100 Kbps @ 433 Mhz<br>500 Kbps @ 900 MHz |
| Transmitter output | 10 dBm max |
| Receiver sensitivity | -95 dBm @ 200 kbps for 1% PER |
| Spreading Technique | Frequency agility, Sub-1G 2GFSK |
| **NETWORK CONNECTIVITY** | |
| Nodes per gateway | Upto 1000 |
| Number of hops | 64 max |
| Routing topology | Source Routing Tree |
| Communicatin standard | Juganu proprietary efficient tree routing, exceeds RPL |
| Addressing paradigm | Proprietary MAC address paradigm |
| Internet protocol | IPV4 (IPV6 available upon request) |
| Advanced bandwidth management | Flexible load management, flexible ad-hoc off-loading |
| Wireless Network Security | Counter Mode Cipher Block Chaining Message Authentication Code Protocol over AES128<br>Pre-Shared Key<br>Public/Private/Dynamic Key |
| Download channel utilization | Download channel, employing frequency diversity |
| Remote Software Update | OTA |
| **ELECTRICAL** | |
| Power supply | Indoor gateway - 5 VDC, 500 mA<br>Outdoor gateway - Universal AC input (RMS Volts) 100-240 (nominal ±10%) through NEMA standard ANSI C136.41 7, 7-pin connector, 10kV protection, 50-60Hz |
| Over voltage survivability (protected) | 300V max, |
| Power consumption | Indoor gateway – 2.5 W<br>Outdoor gateway – 20 W |
| **GENERAL INFORMATION** | |
| Physical dimensions (H*W*D) | Indoor gateway – 150 x 80 x 100 mm<br>(with antenna, D = 150 mm)<br>Outdoor gateway box – 250 x 350 x 150 mm |
| Operating temperature (ambient) | -40°C ÷ +55°C |
| Humidity | 95% non-condensing |
| Ingress Protection | Indoor gateway – IP20<br>Outdoor gateway – IP65 |
| Interfaces | Indoor gateway:<br>• USB type B (POWER) - 5 VDC, 500 mA<br>• RJ45 data line<br>• micro USB (internal use, debug)<br>Outdoor gateway:<br>• AC power – 100-240 VAC |



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JL-DS-GC JNET1 GW _2308 Rev: 1.2

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# Specifications

### Product Data

Product Segment: City & Infrastructure
Product Type: Streets & Roads
Product Family: JNET1

STANDARDS (additional local standards applicable)

| Group | Standard abbreviation | Description |
|---|---|---|
| **CE-RED** | | |
| Safety | EN 62368-1: 2014+A11:2017 | Safety Testing and Report |
| EMC | EN 55015 ( Interior only) | EMC Testing & Report |
| | EN 55032 ( Interior only) | |
| | EN 55035 ( Exterior only) | |
| | EN IEC 62311:2020 ( Exterior only) | |
| | ES 61547 ( Interior only) | |
| | EN 301489-1 | |
| | EN 301489-3 | |
| | EN 301489-19 | |
| | EN 301489-52 (Exterior only) | |
| | EN 61000-3-2 | |
| | EN 61000-3-3 | |
| | EN 62479 | |
| | EN 55024 | |
| | EN 61347 1,2 | |
| Radio | EN 300 220-1 | Radio Test & Report |
| Cellular | *ETSI 301 908 908-1,2,13 (Exterior only)* | Radio module JNET1-433-CELL-OD |
| **cTUVus** | | |
| FCC ID | 47 CFR Part 15 Subpart B | Radio tests for North America market<br>Radio module FCC ID 2ATPH-JNET1-915MHz and JGW-JNET1-915-CELL-OD |
| Safety | UL 62368-1:2014<br>CAN/CSA-C22.2 NO. 62368-1-14 | Safety testing for North America market |
| **Mechanics** | | |
| Ingress Protection Rating | IEC 60529 | Indoor – IP20 rating |
| | IEC 60529 | Outdoor - IP65 rating |



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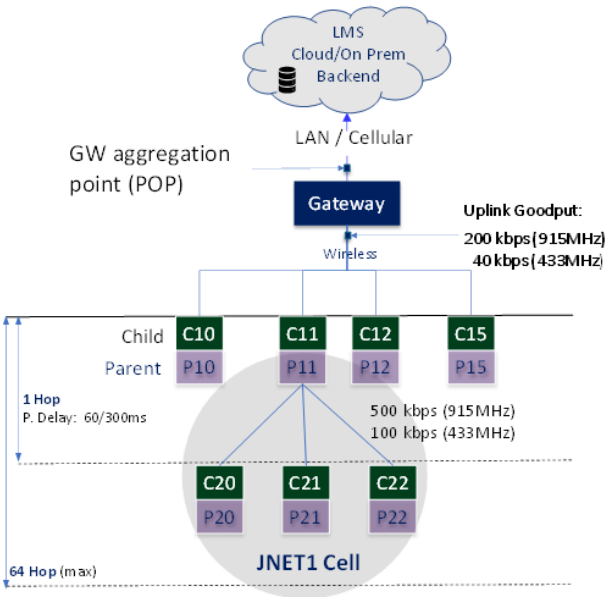
# JNET1 Network Theory of Operation




JNET1 wireless network is based on a Source-Routing-Tree topology. The Gateway's role is bridging between the JNET1 Wireless network and the IP-Internet domain as a point-of-presence (POP). JNET1 Gateway conveys its subtree Nodes (LCUs) data in a two-way-communication link between the LMS center and the network connected Nodes (LCUs). The link between the Gateway to the LMS center is maintained either via a wired IP (RJ45 cable in indoor installations) or via a Cellular broadband modem (in outdoor installations).

To establish the JNET1 network, the gateways send beacon signals to other nearby nodes. In response, the nodes may adopt the transmitting gateway as their parent (Juganu proprietary algorithm/criteria). After becoming a valid child, each node starts behaving also as a parent, sending beacon signals to other nodes, thereby creating additional parent-children groups called "JNET1 Cells" (see the figure on the right). These JNET1 Cells continue propagating to generate the complete subtree.

The following summary highlights the JNET1 characteristics and performance.

## JNET1 Gateway/Network characteristics:

| | | |
|---|---|---|
| Number of nodes per gateway | 1000 | |
| Maximum number of hops | 64 | |
| Maximum children per parent | 16 | |
| Hop propagation delay (min/max) | 60/300 millisecond | |
| **Frequency Band** (2GFSK) | **433 MHz** | **915 MHz** |
| Wireless bandwidth | 100kbps | 500kbps |
| CH. Spacing | 300KHz | 2MHz |
| GW aggregate goodput | 40 kbps | 200 kbps |

## JNET1 Network Performance:

| | | |
|---|---|---|
| JNET1 Broadcast message Travel time | **300** up to **9600** milliseconds | Assuming typical usage of 32 hops, and Hop propagation delay range of 60-300 milliseconds, 32 x (60 .300) |
| JNET1 Network Scan time - Broadcast | **250** seconds @ 433MHz<br>**50** seconds @ 915MHz | Send broadcast status Request to the entire subtree network. All, e.g., 3000 nodes, responding simultaneously.<br>**Response rate**: goodput/message length (**128** bytes) x LBT-Interference Factor (**0.3**)<br>@ 915Mz: (200 kbps / 128 bytes) x 0.3 = 200 x 0.3 = **60** responses/sec<br>@ 433Mz: ( 40 kbps / 128 bytes ) x 0.3 = 40 x 0.3 =**12** responses/sec |
| JNET1 Network Scan time – Unicast | **500** seconds @ 433MHz<br>**100** seconds @ 915MHz | Send reliable/Unicast status request to each node, and wait for all to respond; downlink requests + Uplink responses throughput<br>Assuming outgoing-downlink messages rate equals the incoming-uplink rate (see above), the approximate Unicast Scan time is the Broadcast Scan time doubled; i.e., @433 250 x 2=**500** sec and @915 50 x 2 = **100** sec. |



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## Ordering Information

| Product | Band | CEL | Indoor/Outdoor |
|---|---|---|---|
| JGW-JNET1 | XXX | XXX | XD |

| Model | Description |
|---|---|
| JGW-JNET1-915-ID | Indoor Gateway, 915MHz |
| JGW-JNET1-433-ID | Indoor Gateway, 433MHz |
| JGW-JNET1-915-CEL-OD | Outdoor Gateway, 915MHz |
| JGW-JNET1-433-CEL-OD | Outdoor Gateway, 433MHz |

## # Ordering Example

*JGW-JNET1-915-CEL-OD*

## Description

JNET1 Gateway, 915 MHz , cellular, outdoor



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