LORIOT Network Server

Specification

LORIOT Network Server (LNS) is a service / software for operation and management of LoRaWAN® networks.

From a population of heterogeneous LoRa® gateways, the Network Server creates a uniform, secure, resilient, distributed LoRaWAN® network with a REST / TLS / WebSocket / MQTT data interface. It provides a scalable connectivity back-end for operations of your LoRaWAN® network.

It features flexible, and modular data output interfaces currently including HTTP / REST, WebSocket, TLS Socket, MQTT and several 3rd party services such as Microsoft Azure, PubNub, IBM Bluemix or Amazon AWS IoT.

The primary roles of the Network Server are:

- Granting and protecting access to the network
- Securing data transport from gateways to data consumers
- End-device and gateway provisioning
- Gateway management and monitoring
- Application & device management and monitoring
- Network health and status monitoring

Most of the currently available LoRaWAN® gateways are already pre-integrated with the Network Server and support with the LORIOT Gateway Software.

Many end-to-end and IoT platforms applications are available out-of-the-box, fully integrated and available through our partner network.

Our pricing scheme is flexible and allows for scaling the operational expenses as the network grows.

Core functionality

- Fully distributed, scalable, secure software
- Enables geographically diverse, low-latency deployment
- REST / TLS / WebSocket / MQTT data output interface
- Easily integrates with value-added cloud services (IBM Bluemix, Microsoft Azure, etc.)
- All interfaces secured through TLSv1.2

LoRaWAN® functionality

- LoRaWAN® Link Layer v1.0.X and v1.1 Compliant
- Class A and Class C full support
- Class A and C downlink supported
- LoRaWAN® Multicast supported
- Regional ADR supported
- Adjustable RX window settings
- Adjustable frequency bands setup
- Multi-antenna gateways supported
- Frame cryptographic validation and filtering
- Protection against “Replay and man-in-the-middle attack”
- Penetration tested – countermeasures
- WebSocket / REST / TLS / MQTT interface to Application Server

Device population management

- Unlimited number of devices (240 per network)
- Management of address pool
- Management of cryptographic keys
- Device activation by personalisation (ABP)
- Device activation over-the-air (OTAA)
- Automated device provisioning mechanism
- Device migration from other operators supported
- REST API for device provisioning

Gateway population management

- Semi-automated enrolment and activation
- All network links are TLS secured
- Designed for firewalled / VLAN / cloud scenarios
- Monitoring of KPIs, traffic and radio data
- Automated LORIOT Gateway Software updates
- REST API for gateway provisioning
- Multicast Virtual Networks Connection status and latency alerting
- Reverse SSH-Tunnel

Supported End-devices

- LoRaWAN® v1.0.X and LoRaWAN® v1.1 compliant devices
- Debugging features for non-compliant devices
- Compatibility features / modes for noncompliant devices

Supported Gateways

- All Tektelik models
- All Kerlink models
- All MultiTech models
- Wifx LorixOne
- Link Labs LL-BST-8
- RAK 7249 + 7258
- All Dragino models
- Robustel R300LG
- Ursalink UG87 + UG85
- Gemtek LoRa models
- Augtek LoRa models
- All Cisco models
- Option Cloudgate

- Semtech packet forwarder emulation
- Raspberry Pi + external concentrator
- OpenWrt ar71xx + external concentrator
- Linux x64 + external concentrator
- Custom, low cost R-Pi based gateway
- Any geographically specific radio bands can be supported

Billing records

- Real-time traffic information available for billing
- Per-device, -gateway and -application records
- Per-application and per-device limits

Deployment models

- Community Public Server (free of charge)
- Professional Public Server (SaaS)
- Multi-tenant cloud infrastructure (SaaS)
- Private cloud deployment (Software License)

Key features overview

Sensor network management system

LORIOT Network Server (LNS) is a scalable, resilient Sensor Network Management System for LoRaWAN®. It is designed to run as a cloud service, with a strong focus on security and distributed, high-availability, 24/7 operation.

LNS is an all-in-one solution for LoRaWAN® network operators, allowing users to monitor, query control and manage all LoRaWAN ® system components.

Multi-tenancy / Virtual Private LoRaWAN®

LNS provides a multi-tenant environment. Multiple sensor applications can securely run over the same network in Virtual Private LoRaWAN® networks.

User Management

Multitenant Organisations to manage hierarchy and roles on the network server and enable collaborative operations. Two-factor Authentical supported for User and Admin Interface.

Monitoring and management features for user resources and four standard roles with varying permissions available: Server Operator, Organisation Admins, Standard Users, Read-only Users.

Gateway Management

LNS aims to deliver centralised management and operations facility. A number of key performance indicators are continuously monitored through the system, and a set of remote control tools is available for every gateway.

End-node life cycle Management

Secure and efficient management of the end-nodes is a key functionality of the LNS. It accelerates the deployment and simplifies the operations of a large-scale sensor network.

Monitoring and diagnostics

The system monitors in real-time a large number of key performance indicators for all the components. Based on this information the system can provide an early indication of potential problems in the sensor network.

User Interfaces

Web-based user interfaces enable convenient management of all components and network parameters.

System interfaces (API)

The user interfaces are complemented by a comprehensive set of secure, RESTful APIs, allowing for the integration of the LNS with existing systems and development of custom control interfaces.

Billing

Along with performance indicators, LNS collects statistics on the data transferred through the network. The collected data can be exported into an existing billing system.

Various subscription models can be defined in the system to limit the maximum number of sent/received messages per device per day.

Deployment

For easy on-boarding and a short time to market, we offer the software as a geographically distributed service. For customers wanting to run the system on- premise, we offer a software license.

Requirements

LNS can run in a container, a virtual machine, or on bare metal. The only system requirement is 64 bit Linux operating system and availability of NTP time synchronisation.

Scalability

Horizontal scaling of the system allows for scaling of the system as the network size grows.

LNS can also be scaled up and use all available / newly added system resources.

Interfaces

Application Programming Interfaces

- Management interfaces are HTTP based
- REST / HTTPS for commands and controls
- WebSocket for real-time interaction
- Separate API for data access (WebSocket, TLS Socket, REST / HTTPS, MQTT)

API interfaces are built around industry standard protocols. Data interfaces are built as flexible output modules, that can easily integrate new transport layers. Management interfaces are available over a REST/HTTPS interface.
Real-time interaction and server-side notifications are delivered through WebSockets.

User Interfaces

- HTML5 / JavaScript
- Web browser based
- Can be used as a sample implementation of the REST API
- User interfaces are web browser based and are optimised for usage in Chrome and Firefox.