ResIOT LoRaWAN™ Network Server and IoT Platform v.2.4.869 (29/08/2019)

Include the components:

ResIOT LoRaWAN™ Network Server: Management of the LoRaWAN radio protocol and Gateways Control

ResIOT IoT Platform/Application Server: management platform for all data and communications

ResIOT Base Station Server: software component for infrastructure management and total control of gateways

ResIOT Base Station Client/Merlin IoT Box: software to be installed on the gateways to allow complete remote control

ResIOT Reverse Proxy Server: for direct access via SSH or web interface to the gateway without VPN. ResIOT manages a secure connection only if requested

ResIOT LoRaWAN™ Network Server v. 2.4.869	
LoRaWAN™ Protocol	Full support LoRaWAN 1.02, 1.03 and 1.1
Frequency/ISM Bands/Regional Support	EU 863..870 MHz US 902..928 MHz CN 779..787MHz EU 433 MHz AU 915..928 MHz CN 470..510 MHz AS 923 MHz KR 920. .926 MHz IN 865..869 MHz RU 864..870MHz
LoRaWAN™ Nodes Class	Class A,B,C
LoRaWAN™ Multicast	Yes, Class C ABP
Authentication	OTAA(Overt-the-air-activaction) ABP(Activation by personalization)

ADR - Adaptive Data Rate Algorithm	Yes, with evaluation through RSSI, SNR and other radio parameters. It is possible to configure for a sensor or groups of sensors specific rules in which for example they must not exceed the speed SF9, or the ADR must be disabled ..
Packet de-duplication	messages received from multiple gateways are automatically de-duplicated
Uplink Messages	Encoded in Hex
Downlink Messages and Duty cycle optimization	Yes, with Downlink ResIOT™ Intellqueue™: choice of the gateway for sending downlinks based on latencies and duty cycle and connection types with retry / rotate gateway functions for devices in Class A, B and C. Configurable sending timeout for each message for class C devices
Duty cycle rules and policies	It is possible to configure limits for devices or users in the use of downlinks by configuring the maximum time that can be used in a certain period of time or have it managed directly by the network server, calculating it based on the number of gateways installed in the area
LoRaWAN™ Messages type	Confirmed/Unconfirmed
Devices Channel Management	Advanced: for frequencies that allow it to dynamically send additional channels to all connected devices calculated by the present gateways (requires ResIOT Base Station Client/IoT Merlin Box)
Key management	The keys configured for the sensors(ABP,OTAA) are saved safely and kept in double copy with a history of all the changes
Blocking messages from other NETID networks	it is possible to send gateways (ResIOT Base station Client) such as NETID to exclude in order to block the traffic of irrelevant radio messages and optimize the traffic to the network server. (usable in networks in which the devices are only OTAA)
gRPC JSON REST API	Integrate ResIOT™ inside any third-party software with any type of languages programming. More than 150 APIs available for

		the management of devices / gateways , connectors and variables
Statistics	Real Time Monitor (Traffic, Signal, timetoair..) LoRa Traffic Analyzer for advanced management of radio channel occupation with alert Communication Log Generic Log
Device management	Manual entry Import from csv file Complete control via Api
LoRaWAN™ functions for large networks	In installations of large city or industrial networks ResIOT™ supports functions such as device sharing, simultaneous management of different networks with different SLAs, profiling of users with limitations in the use of gateways, traffic and the number of devices that can be used
Multi tenant	Yes, creation of infinite and distinct network servers for countless customers or organizations
User/Policy management	Yes: sharing of gateways and devices among the various users with group and user management
Data Adapters & Connectors	Real time, simultaneous and persistent connections with multiple ResIOT™ LoRaWAN™ Network Severs and other connectors: - MQTT Brokers client or server - Websockets client or server - Azure IoT - AWS IoT - Http pusher client or server - Modbus client or server - Snmp Trap Server - MongoDB Pusher - SQL Pusher (Mysql, PostgreSQL, Sql Server)
LoRaWAN™ MAC Command	view *Tab1

Support	
Interface	User friendly secure web interfaces (responsive bootstrap for mobile phone and tablet)
Support for multiple instances High availability and scalability	Yes, with failover support
Supported OS	Linux Ubuntu 64bit 16.04 LTS Ubuntu 64bit 18.04 LTS Debian 8+ Windows 64 bit 7/8/10 Server 2008/2012/16/19 Arm/Linux
Upgradable	Yes, with Live Update functions
Licensing/Setup	On-premises on private server or provided in a cloud environment, Google, AWS,OVH, Digitalocean,Azure with OPEN license on consumption or Fix license
Gateways/Base stations Support	Gateway/Base station with software ResIOT Base Station Client/IoT Merlin Box preinstalled with TCP Protocol or Gateway with Semtech Protocol UDP v.1/2 (in case of connection with Semtech standard UDP protocol it is not possible to check the gateway status, configure the channels, etcc therefore to be used only for test purposes)
ResIOT Base Station Client/Merlin IoT Box Build 1231	
Supported gateways	Kerlink, MultiTech, Cisco, Aaeon,Tektelik, Lorixone, ResIOT X2,X7.. (available to support new models)
Connection from gateway to	Secure TCP, protocol: Websocket, Mqtt and Rest API to network

network server	server
Management and configuration	Completely automated and centralized, all the parameters are configured within the network server and then takes care of sending them correctly to the gateways
Radio Channel configuration	Custom remote channel configuration Automatic reconfiguration of channels for gateways and devices
Data retention	In case of loss of network connection between gateway and network server the arrived radio messages are not lost, they are saved in memory and forwarded to the network server when the connection is restored. (in this configuration the platform decrypts the message and saves it as a payload with correct date of arrival but obviously cannot handle messages returning to the sensor as ack ...)
Health check and gateway status	Advanced watch dog for Gateway hardware / software Automatic restart of network,services or system in case of fail Radio card, LTE/Ethernet connection
Monitoring and reporting	Full monitoring of all parameters: Disk, Memory, Cpu, ethernet or 2g/3g/4g/Lte quality connection All data is sent periodically to the network server and visible through graphs and reports
Alert management	It is possible to configure different types of alerts by configuring different alert thresholds for: timeout, 2g / 3g / 4g / Lte connection quality, disk errors, full Ram ... The alerts can be configured and sent by ResIOT with email, Snmp server, Snmp trap, Modbus, generic Curl call, etc ... through the ResIOT platform functions and programmable in Lua scripts
VPN management	It is possible to configure and send the VPN configuration remotely
Software management	Through web interface [gateway ip: 50056], API or remotely through ResIOT Network Server

Reverse proxy support	It is possible to configure a reference server (ResIOT Reverse Proxy) for direct access via SSH or web interface to the gateway even without VPN. ResIOT manages a secure connection only if requested
Autoprovisioning	With the ResIOT™ Autoprovisioning functionality, the gateway automatically configures itself to the LoRaWAN™ network without the need for other interventions. The gateway is completely manageable remotely. It also has a practical web control interface
Easy installation wit App IoS/Android and QRCODE	Ror the supported models it is possible to create a QRCODE on the label to be pasted on the gateways (by default on the ResIOT X2, X7 gateways we produce). Through the IoS / Android ResIOT mobile app it is possible to connect a gateway to the network in just a few seconds and safely.
Supported OS	Linux 23/64 bit Arm/Linux
Upgradable	Yes, with Live Update functions

ResIOT IoT Platform / Application Server v. 2.4.869	
Programmability	ResIOT™ Platform integrates the Lua5.1 scripting language interpreter into the ResIOT™ Smart Advanced Scene. In addition to the standard functions, more than 100 functions have been introduced to integrate with all the devices in the system, for parsing the payloads with hexadecimal management, bytes array, for saving data (eg temperature and humidity with dynamic creation of charts), to send downlinks, manage queues, create alerts, debug and much more
Device Data Model	Advanced: possibility to create customized models with fields / events and commands for saving historical data and display them in dashboard in real time. Payload parsing with Lua 5.1 scripting.

Data retention	It is possible to configure for how many days the payload data or the data parsed in values (such as temperature, humidity, etc.) must be maintained
Infinity Automation	With ResIOT™ Smart Scene and ResIOT™ Advanced Scene with Lua 5.1 scripting language, you can build and setup all kinds of automation between IOT LoRaWAN™ devices, Low Power Wide Area Network or standard protocols Tcp, Http, Curl devices See manual: docs.resiot.io Scheduling: It is possible to schedule any type of event or action at configured intervals
Dashboard	Yes with widgets: - Maps (Google / Openstreetmaps) : monitoring of gateways and devices on a map for synoptic errors or defects in real time - Real time Charts: Line, Bars, Gauge, Pie , Radar, Polar area with custom design - Buttons: for actions - Table values and notes html - Image with static positioning of sensors for building maps
Web interface	Yes, responsive bootstrap. Full support for Chrome, FireFox and Safari, Edge
Data Adapters & Connectors	Real time, simultaneous and persistent connections with multiple ResIOT™ LoRaWAN™ Network Severs and other connectors: - MQTT Brokers client or server - Websockets client or server - Azure IoT - AWS IoT - Http pusher client or server - Modbus client or server - Snmp Trap Server - MongoDB Pusher - SQL Pusher (Mysql, PostgreSQL, Sql Server)

gRPC JSON REST API	Yes: Integrate ResIOT™ inside any third-party software with any type of languages programming. More than 150 APIs available for the management of devices / gateways / Smart scenes / connectors and variables
App Mobile	IoS, Android
Asset management Tracking & Maps	ResIOT™ Dashboard integrates a management system for Openstreetmap™ and Google Maps™ with which it is possible to monitor the position or the path of the devices
IoT preconfigured devices	More than 150 preconfigured devices to simplify use in plug-and-play mode. Some manufacturers: Ascoel, MultiTech, Adeunis, Elsys, etc. With the guided procedure it is possible to quickly connect the devices and immediately start using them without complex payload decoding configurations
Alerts and Notifications	Built-in notification system on events: messages can be sent via email using private SMTP servers, with Telegram™ BOT or displayed directly on the ResIOT™ dashboard. It is also possible to send messages through ResIOT™ Smart Scene or Advanced Scene Lua5.1
Plug-in Support	it is possible to export Lua scripts to a Plug-in and then distribute it to other ResIOT installations in order to optimize the release and maintenance of applications such as Smart Parking, Smart Agricolture ... (with version control)
Storage System	PostgreSQL (Linux or Windows) or SQLite (only ARM) Redis
Internal Message Queue Software	MQTT protocol versions 3.1 and 3.1.1: Mosquitto,RabbitMQ, EMQX, VerneMQ, HiveMQ.. Google Pub/Sub
Support for multiple instances High availability and scalability	Yes, with failover support
Supported OS	Linux

	Ubuntu 64bit 16.04 LTS Ubuntu 64bit 18.04 LTS Debian 8+ Windows 64 bit 7/8/10 Server 2008/2012/16/19 Arm/Linux
Upgradable	Yes, with Live Update functions
Software Live Update	Yes, automatic updates even scheduled at certain times

LoRaWAN Mac Commands Support (*Tab1)

CID	Command	Transmitted by		Description
		End Node	**Gateway**	
0x01	ResetInd	x		Used by an ABP device to indicate a reset to the network and negotiate protocol
0x01	ResetConf		x	Acknowledges ResetInd command
0x02	LinkCheckReq	x		Used by an end-device to validate its connectivity to a network
0x02	LinkCheckAns		x	Answer to LinkCheckReq command. Contains the received signal power estimation indicating to the end-device the quality of reception (link margin)
0x03	LinkADRReq		x	Requests the end-device to change

				data rate, transmit power, repetition rate or channel.
0x03	LinkADRAns	x		Acknowledges the LinkADRReq.
0x04	DutyCycleReq		x	Sets the maximum aggregated transmit duty-cycle of a device
0x04	DutyCycleAns	x		Acknowledges a DutyCycleReq command
0x05	RXParamSetupReq		x	Sets the reception slots parameters
0x05	RXParamSetupAns	x		Acknowledges a RXParamSetupReq command
0x06	DevStatusReq		x	Requests the status of the end-device
0x06	DevStatusAns	x		Returns the status of the end-device, namely its battery level and its demodulation margin
0x07	NewChannelReq		x	Creates or modifies the definition of a radio channel
0x07	NewChannelAns	x		Acknowledges a NewChannelReq command
0x08	RXTimingSetupReq		x	Sets the timing of the of the reception slots
0x08	RXTimingSetupAns	x		Acknowledges RXTimingSetupReq command
0x09	TxParamSetupReq		x	Used by the Network Server to set the maximum allowed dwell time and Max EIRP of end-device, based on local regulations

0x09	TxParamSetupAns	x		Acknowledges TxParamSetupReq command
0x0A	DlChannelReq		x	Modifies the definition of a downlink RX1 radio channel by shifting the downlink frequency from the uplink frequencies (i.e. creating an asymmetric channel)
0x0A	DlChannelAns	x		Acknowledges DlChannelReq command
0x0B	RekeyInd	x		Used by an OTA device to signal a security context update (rekeying)
0x0B	RekeyConf		x	Acknowledges RekeyInd command
0x0C	ADRParamSetupReq		x	Used by the Network Server to set the ADR_ACK_LIMT and ADR_ACK_DELAY parameters of an end-device
0x0C	ADRParamSetupAns	x		Acknowledges ADRParamSetupReq command
0x0D	DeviceTimeReq	x		Used by an end-device to request the current date and time
0x0D	DeviceTimeAns		x	Sent by the network, answer to the DeviceTimeReq request
0x0E	ForceRejoinReq		x	Sent by the network, ask the device to rejoin immediately with optional periodic retries
0x0F	RejoinParamSetupReq		x	Used by the network to set periodic device Rejoin messages
0x0F	RejoinParamSetupAns	x		Acknowledges rejoinParamSetupReq