LoRaWAN® European Roaming Guidelines

NOTICE OF USE AND DISCLOSURE

LoRa Alliance, Inc.
5177 Brandin Court
Fremont, CA 94538
United States

LoRaWAN® European Roaming Guidelines Technical Recommendation (TR8-1.0.0)

Authored by the Roaming Working Group of the LoRa Alliance Technical Committee

Technical Committee Chair and Vice Chair:
A.YEGIN (Actility), O.SELLER (Semtech)

Working Group Chair:
A.YEGIN (Actility)

Editor:
P.COLA (Bouygues Telecom)

Contributors:
E.BRUINZEEL (KPN), J.CATALANO (Kerlink), P.COLA (Bouygues Telecom), J.ERNST (Swisscom), N.RUDA (CRA), T.SCHABERL (SENS)

Version: 1.0.0
Date: June 4, 2021
Status: Final

Contents

Figures

Tables

1 Introduction

Today, all operators offering roaming have implemented Passive Roaming with Activation Away feature (see Backend Interfaces Specification [TS2]).

To optimize the QoS of Passive Roaming on the LoRaWAN Network, it is necessary to define and share a few technical requirements between operators.

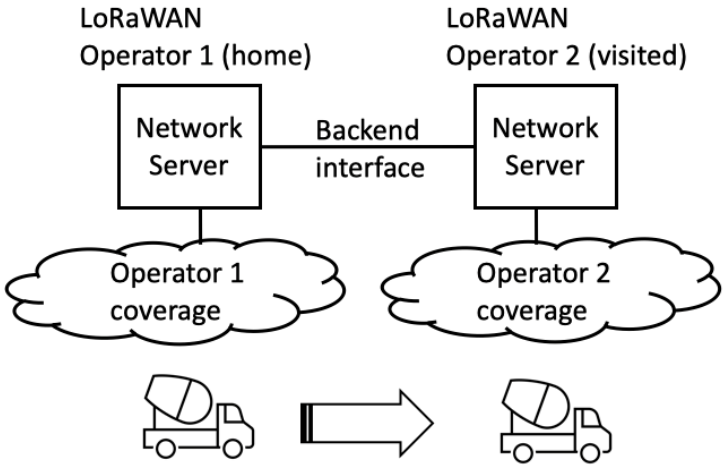

Figure 1: Global Architecture for Roaming Between Operators

Figure 1 illustrates the architecture between two public LoRaWAN operators.

The regional parameters depend on the country and regulations ([RP]). In each country, each public operator has its own radio frequency plan.

The challenge is that when the device moves to a different operator's coverage, it changes the operator; however, the device does not recognize this change and continues to use the previous radio parameters (frequency plan, etc.).

It is necessary to share the information described in this document with network operators to optimize the QoS and improve network resources of the device.

2 Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

3 List of Radio Parameters to Share

3.1 Channel Plan

It is necessary for an operator to share as many channels as possible with other operators to optimize the probability of successfully receiving an uplink when a device moves out of an operator's coverage area and into another.

Table 1 lists the minimum set of channels an operator in Europe SHOULD support on its network.

Information in Table 1 was deducted from surveying the European operators and the channels they use. It represents a minimum set of channels that were supported by operators reporting to the survey.

Logical Channel	Channel Index	Default	DR Min	DR Max	Uplink Freq
1	0	Yes	0	5	868.1
2	1	Yes	0	5	868.3
3	2	Yes	0	5	868.5
4	3	Region set	0	5	867.1
5	4	Region set	0	5	867.3
6	5	Region set	0	5	(Not common)
7	6	Region set	0	5	(Not common)
8	7	Region set	0	5	867.9

Table 1: Recommended Minimal European Channel Plan for Roaming

3.2 RX Parameters

In the LoRaWAN Link Layer Specification [TS1], there are 2 receive windows defined to send a message to a Class A device: RX1 and RX2.

To have enough time to send a downlink in a roaming situation, we recommend setting the RECEIVE_DELAY1 parameter to 5 seconds.

3.3 Channel Modifications when Roaming

There are 3 possible roaming device movement scenarios, as depicted in Figure 2.

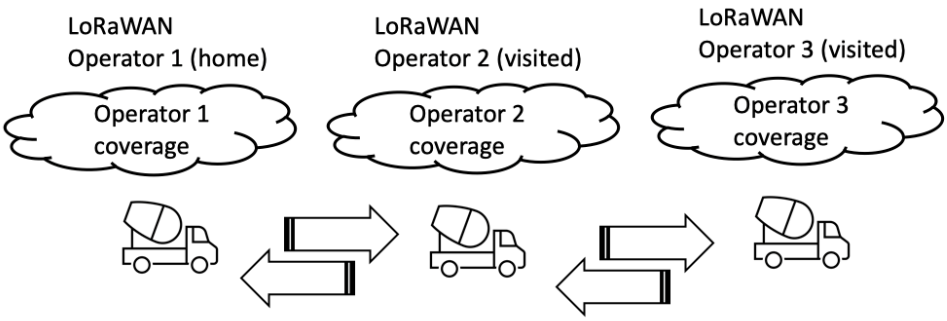

Figure 2: Roaming Situations

3.3.1 From Home Network to Visited Network

When the home NS detects that the device is roaming (the device moves from home coverage to visited coverage), the home NS receives a **PRStartReq** for this device via the backend interface. There are then 2 possible outcomes:

- If the visited network channel plan is included in the home network channel plan, the home network sends a **LinkADRReq** command to modify the Channel Mask (to change the mask and not the channels).

- If the visited network channel plan is different from the home network channel plan, the home network sends a **NewChannelReq** to the device to add or modify the necessary channels.

3.3.2 From Visited Network to Home Network

Same procedure as in Section 3.3.1 using the channel plan of the home network.

3.3.3 From Visited Network to Another Visited Network

Same procedure as in Section 3.3.1 using the channel plan of the new visited network.

4 Glossary

AS	Application Server
NS	Network Server
RX1	First receive window
RX2	Second receive window
QoS	Quality of Services
RX Delay	Delay between TX (transmission) and RX (reception)

5 Bibliography

5.1 References

[TS1] LoRaWAN® Link Layer 1.0.4 Specification, LoRa Alliance, October 2020

[RP] LoRaWAN® Regional Parameters, LoRa Alliance, May 2021

[TS2] LoRaWAN® Backend Interfaces 1.1 Specification, LoRa Alliance, October 2020