

The LoRaWAN Specification update and roadmap

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Technical committee work

- LoRaWAN1.0 1.0.1 1.0.2
- LoRaWAN1.1 → →
- Roaming interfaces between back-end servers
- NetID (network identifier)



LoRaWAN versions : 1.0 ⇔ 1.0.1

- 1.0.1 is available on the portal for download
- It includes a lot of typo correction and clarifications
- The only functional difference between 1.0 and 1.0.1 is the correction of the device's hidden state problem when changing DL parameters
- This version will not be made public , internal use only

Next public version is 1.0.2



LoRaWAN versions : 1.0.1 ⇔ 1.0.2

1.0.2 will soon be available

- Added support for AsiaPac country cluster
- This required to add 2 new MAC commands

TXParamSetupReq	Modify device max EIRP and dwell time
DLChannelReq	Modify frequency at which device opens first RX1 slot

- The spec was split in 2 documents
 - Protocol specification LoRaWAN1.0.2 (requires IPR)
 - Regional PHY layer specification (does not require IPR when modified)



1.0.1 ⇔ 1.0.2

- Do I need to upgrade to 1.0.2 when is it published ?
- When should I implement 1.0.2 in my device ?
- Why did we need to add those 2 MAC commands ?



1.0.2 : worldwide support

- EU [863-870MHz]
- EU [433MHz]
- Russia [863-870MHz]
- New-Zealand [915-928MHz]
- Australia [915-928MHz]
- U.S.A [902-928MHz]
- Canada [902-928MHz]
- South Korea [920.9-923.3MHz]
- China [779-787MHz]
- Brunei [923-925 MHz]
- Cambodia [923-925 MHz]
- Hong Kong [920-925 MHz]
- Indonesia [923-925 MHz]
- Japan [920-928 MHz]
- Laos [923-925 MHz]
- New Zealand [915-928 MHz]
- Singapore [920-925 MHz]
- Taiwan [922-928 MHz]
- Thailand [920-925 MHz]
- Vietnam [920-925 MHz]



What's coming in LoRaWAN 1.1

In 1.1 we have defined two kinds of complementary roaming process for mobile devices:

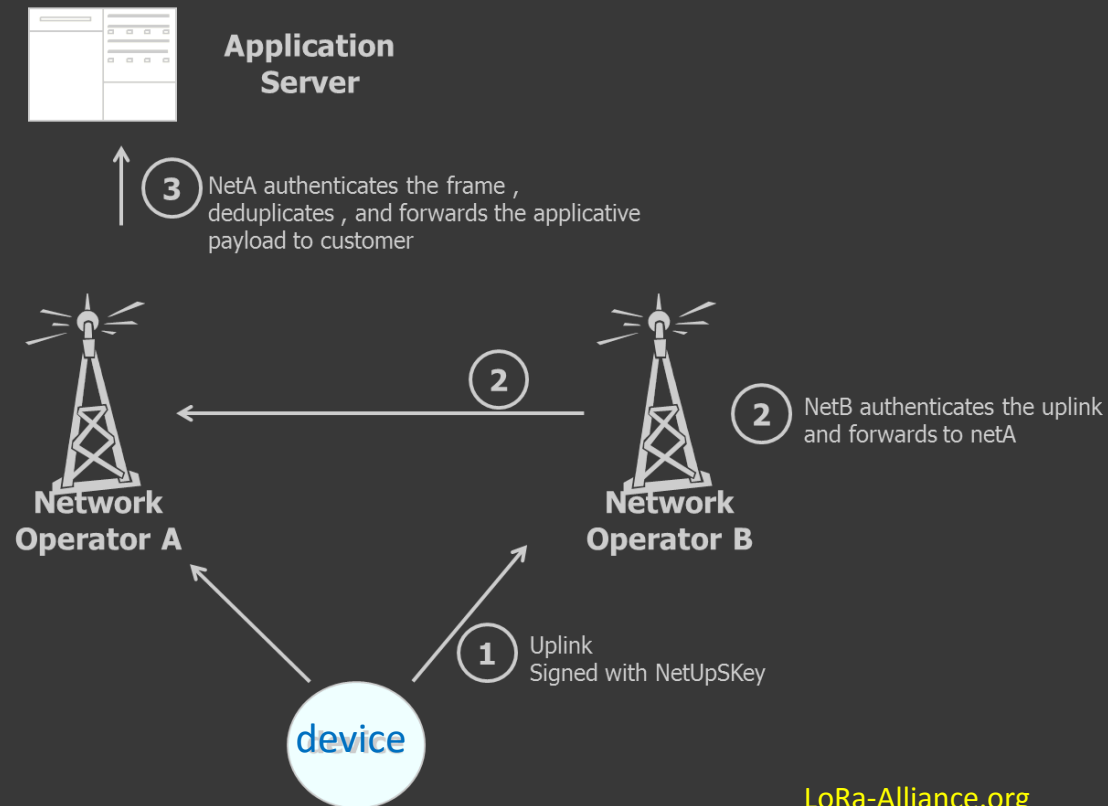
- Passive roaming
- Hand-over roaming

and

- Class B
- Temporary class A/C mode switching

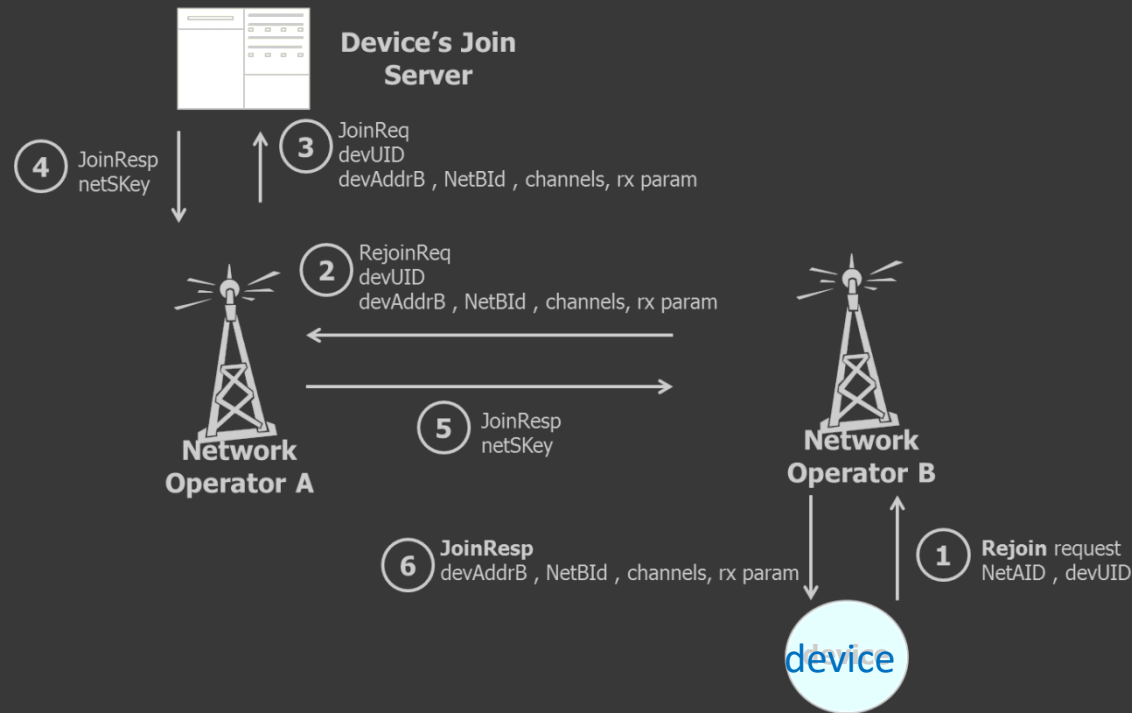
Passive roaming : V1.1

- A device's uplink can be received by two networks simultaneously
- The device doesn't even now he is roaming !



Mobile Hand-over roaming

- The mobile device is handed-over to another network operator
- Data is still routed through the home network





What do we need to introduce to make it work ?

- **For Hand-over roaming** : The device must periodically broadcast a special “ReJoin request” frame
 - This has been defined in V1.1
- **For passive roaming** : We need to use different network session keys for uplinks and downlinks
 - V1.1 implements a new dual NetSKey key derivation
 - The scheme revert back to 1.0 if the server does not support it

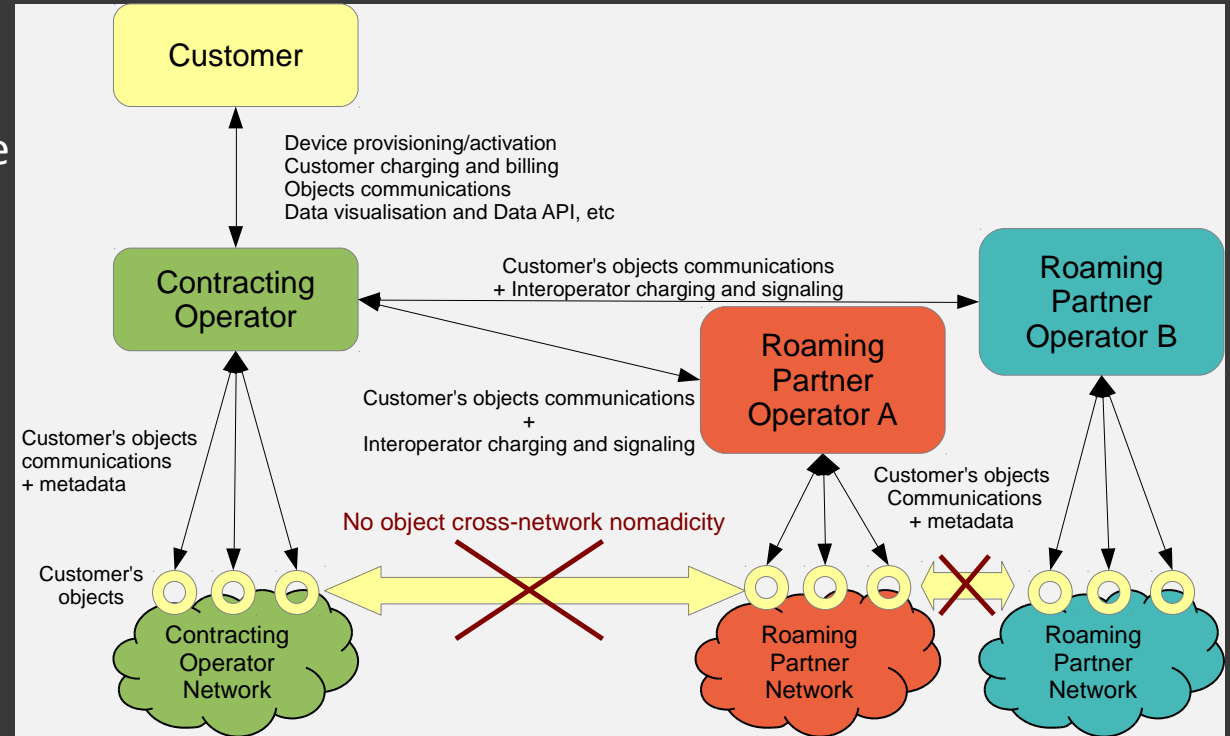


When/why do I need 1.1 ?

You need 1.1 for mobile roaming between networks
without service interruption

What you can soon do using LoRaWAN 1.0

Service provided over multiple public partner networks, with non-nomadic devices





Core network back-end interfaces

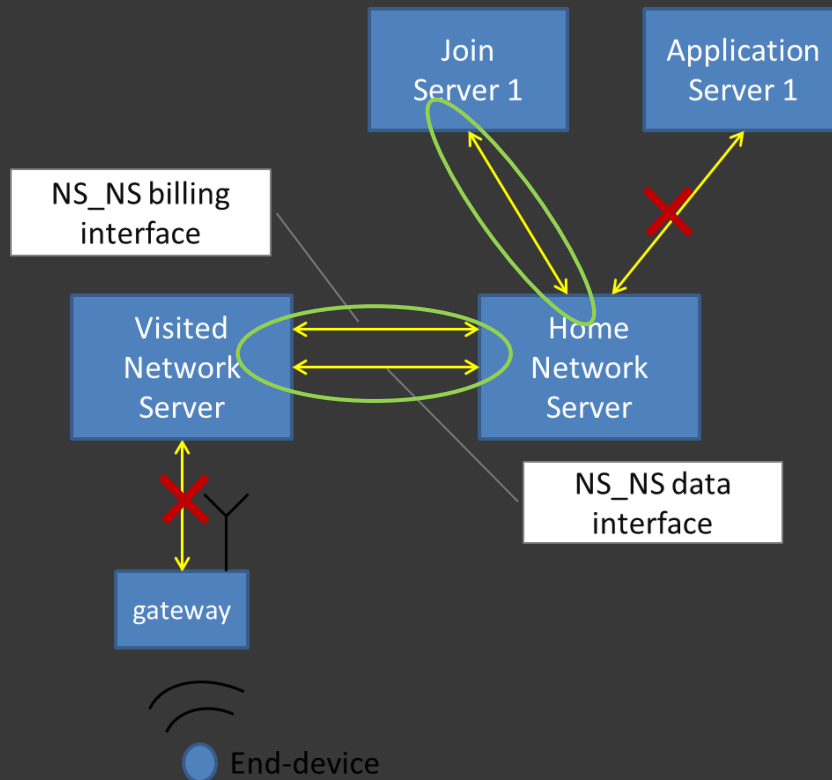


Why ?

- When a never-seen device appears on a network , this network must be able:
 - To find which application owns that end-device's data ?
 - What is the home network of the device ?
 - Where are the device's secret keys stored ?
 - Does the home operator requests roaming for that device or not ?

Hand-over from Home to Visited network requires:

- Network Server to Network Server interface
- Network Server to Join Server interface
- A join server discovery mechanism





Back-end interface specifications

The TC is currently working to define:

- A standardized secured and authenticated interface between those core network components
- A discovery mechanism of the Join Server based on the device's AppEUI (now replaced by JoinEUI) using a DNS infrastructure



All this delayed class B specification ..

We considered that roaming was absolute priority.

Who needs class B ?



NetID allocation

- NetID is a 24bit network identifier : 16 millions possible networks
- NetID is part of the Rejoin frame broadcasted by roaming end-devices , used to find the home network of a device.
- NetID is allocated by the alliance
- NwkID consists of the 7 LSBs of NetID
- All devAddr of a network start with NwkID

Bit#	[31..25]	[24..0]
DevAddr bits	NwkID	NwkAddr



How many end-device can a network host ?

Bit#	[31..25]	[24..0]
DevAddr bits	NwkID	NwkAddr

- A lot more than $2^{25} = 33$ millions
- Actual device identifier is DevAddr + Network_session_key so the same devAddr can be reused many times.

The answer is many billions ...

Once you reach a billion , you get a new NetID allocated 😊



Why should I respect this rule ? why cannot I allocate random devAddr to my devices ?

Bit#	[31..25]	[24..0]
DevAddr bits	NwkID	NwkAddr

- When a visited network receives an uplink
- NwkID is used to find who that device belongs to (modulo 128)

Conclusion: Your frames will never be routed to you



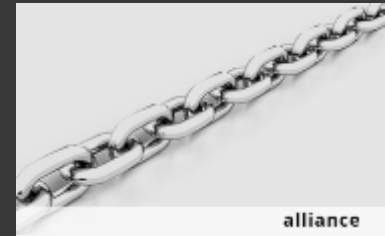
Experimental networks

- Use NetID = 0 or 1 modulo 128
- Example : 0, 1 , 128 , 129 , 512, 513
- This means all your devAddr have to start with 7'b00000000 or 7'b00000001 until you get an allocated NetID



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