



LoRaWAN® End-Device and Network Server Interoperability Test Report Template

Project Information

Batch End Device: **OrbiWise Sampols Noise Sensor**

Date of Report: **June 29, 2026**

Test Engineer: **Alberto García Molero**

Organizations: **OrbiWise SA**

Interoperability Test Plan Version: **v1.1.1**

LoRaWAN Version Tested (e.g. 1.0.2, 1.0.4): **1.0.4**

Frequency Plan ID (e.g. EU868, US915, AS923, etc.): **US915**

Network Server Make/Model: **OrbiWAN R7.5**

Gateway Make/Model: **Browan WLRGFM-100 (US915, 8-channel), running software version 3.03.13-opdk**

Application Server Make/Model: **OrbiWise FlintCORE v1.5**

Join Server Make/Model: **OrbiWAN R7.5**

Device Under Test (DUT) Summary

DUT ID	DUT Make/Model	Act Modes (OTAA/ABP)	DUT Configuration Notes	Comments
1	OW-0004-01.6-US915	OTAA	Preconfigured to transmit every 5 minutes	Device debugger connected

Summary of Test Results

DUT ID	Test Case	Test Description	Result	Observed Events	Comments
DUT-1	3.2.1.1	ABP Activation	N/A	N/A	DUT supports OTAA only
DUT-1	3.2.2.1	OTAA Join Procedure	Pass	- JoinRequest - JoinAccept (JoinNonce, DevAddr allocated from the Orbiwise NetID, default RX1DRoffset, RX2DR and RXDelay, CFList enabling 8 channels) - Uplink transmitted on one of the enabled CFList channels	Verified via LNS trace and device debugger
DUT-1	3.2.2.1	OTAA Rejoin Procedure	Pass	- JoinRequest - JoinAccept (JoinNonce, DevAddr allocated from the Orbiwise NetID, default RX1DRoffset, RX2DR and RXDelay, CFList enabling 8 channels) - Uplink transmitted on one of the enabled CFList channels - Downlink containing LinkADRRReq received	Verified via LNS trace and device debugger

				5. Operator-triggered confirmed downlink 6. Uplink transmitted with LinkADRs confirming the requested parameters 7. ConfirmedDataDown received 8. Next uplink transmitted with the ACK bit set	
DUT-1	3.2.2.1	RxDOffset / Rx2DataRate / RxDelay	Pass	1. DUT assigned to a service profile with modified RX1DROffset, RX2DR and RXDelay settings 2. JoinRequest 3. JoinAccept (JoinNonce, DevAddr allocated from the Orbiwise NetID, modified RX1DROffset, RX2DR and RXDelay, CFList enabling 8 channels) 4. Uplink transmitted on one of the enabled CFList channels 5. Downlink received in RX1 using the configured RX1DROffset, RX2DR and RXDelay settings	Verified via LNS trace and device debugger
DUT-1	3.2.3.1	Unconfirmed Uplink	Pass	1. Operator-triggered unconfirmed uplink 2. UnconfirmedDataUp received by the Network Server 3. Application payload delivered to the Application Server	Verified via LNS trace and device debugger
DUT-1	3.2.3.1	Confirmed Uplink	Pass	1. Operator-triggered confirmed uplink 2. ConfirmedDataUp received by the Network Server 3. ACK transmitted by the Network Server 4. Next ConfirmedDataUp transmitted with incremented FCntUp	Verified via LNS trace and device debugger
DUT-1	3.2.3.1	ADR Fallback	Pass	1. Device automatically transmitted unconfirmed uplinks every 5 minutes with ADR enabled 2. Gateway powered off, preventing Network Server downlink responses. 3. UnconfirmedDataUp messages transmitted without receiving downlink responses 4. ADRACKReq bit set after ADR_ACK_LIMIT uplinks without downlink 5. TxPower restored to the default value after ADR_ACK_DELAY	Verified via LNS trace and device debugger

					6. DataRate reduced step-by-step every ADR_ACK_DELAY uplinks 7. Default uplink channels re-enabled after reaching the lowest supported DataRate 8. Communication restored after the gateway was powered on	
DUT-1	3.2.3.1	Missing or Malformed MAC Command Replies	N/A	N/A		DUT is compliant with the LoRaWAN 1.0.4 specification. Developing custom firmware solely to deviate from the standard behavior was not justified for the purpose of this interoperability evaluation.
DUT-1	3.2.4.1	Unconfirmed Downlink	Pass	1. Operator-triggered unconfirmed downlink 2. UnconfirmedDataDown transmitted by the Network Server 3. Application payload received and processed by the DUT 4. Next uplink confirms successful downlink processing	Verified via LNS trace and device debugger	
DUT-1	3.2.4.1	Confirmed Downlink	Pass	1. Operator-triggered confirmed downlink 2. ConfirmedDataDown transmitted by the Network Server 3. Application payload received and processed by the DUT 4. Uplink transmitted with the ACK bit set 5. ACK received and confirmed by the Network Server	Verified via LNS trace and device debugger	
DUT-1	3.2.4.1	Atomic LinkADRReq Processing	Pass	1. Network Server configured to send the complete channel mask instead of only the modified mask 2. DUT operating on FSB1 3. Operator moves the DUT under the coverage of a gateway supporting FSB1 and FSB2 4. DUT automatically transmits the next scheduled uplink	Verified via LNS trace and device debugger	

				5. Downlink received with two contiguous LinkADDRReq commands requesting the FSB1 + FSB2 channel mask 6. Uplink transmitted with two LinkADRAns MAC commands confirming the requested channel-mask update 7. Final DataRate, TxPower and NbTrans values applied from the last LinkADDRReq 8. Subsequent uplinks transmitted using the updated FSB1 + FSB2 channel set	
DUT-1	3.2.4.1	TxPower Handling	Pass	1. DUT operating with TXPower index 5 (20 dBm) 2. DUT automatically transmits the next scheduled uplink 3. Downlink containing LinkADDRReq requesting TXPower index 6 or higher (lower transmit power) 4. Uplink transmitted with LinkADRAns accepting the requested TXPower index 5. Subsequent uplinks transmitted using the requested TXPower index	Verified via LNS trace and device debugger
DUT-1	3.2.4.1	NewChannelReq Handling	N/A	N/A	Not applicable to US915 fixed channel-plan region.
DUT-1	3.2.4.1	LinkADDRReq Fixed Channel-Plan Handling	N/A	N/A	DUT supports all 72 US915 uplink channels and uplink data rates (DR0–DR4). The optional LR-FHSS uplink data rates (DR5/DR6) are not supported by the gateway; therefore, this test could not be performed.
DUT-1	3.2.5.1	Class B Tests	N/A	N/A	DUT does not support Class B operation.



DUT-1	3.2.6.1	Class C Tests	Pass	1. DUT operating in Class A mode 2. Operator creates a new FUOTA campaign 3. The OrbiWAN FUOTA Server prepares a short-lived multicast session for the FUOTA campaign 4. Multicast group parameters provisioned using McGroupSetupReq / McGroupSetupAns 5. Multicast Class C session programmed using McClassCSessionReq / McClassCSessionAns 6. At the scheduled start time, the DUT automatically switches from Class A to Class C for the duration of the multicast session 7. The OrbiWAN FUOTA Server delivers the fragmented firmware file to the multicast group 8. DUT successfully receives the multicast fragments and automatically returns to Class A mode.	Verified using the OrbiWAN FUOTA Server activity log and device debugger during a FUOTA update campaign.
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Test Engineer Summary and Notes (Batch Level)

Overall Interoperability Evaluation:

The DUT (DevEUI: 70-B3-D5-07-80-00-0A-89) was connected to an OrbiWAN LNS R7.5 instance using the US915 frequency plan throughout the second half of 2025 and early 2026. During this period, the device underwent multiple FUOTA campaigns involving repeated firmware upgrades and downgrades using delta firmware images. The device consistently joined the network successfully, exchanged uplink and downlink messages, responded correctly to LoRaWAN MAC commands, and successfully completed all FUOTA campaigns without interoperability issues. All applicable interoperability tests executed during this evaluation passed successfully.

For verification of the Atomic LinkADRReq Processing test, a second US915 Kerlink Wirnet iBTS v2 gateway provisioned with FSB1 and FSB2 uplink channels was added to the test environment, enabling validation of contiguous LinkADRReq processing and channel-mask updates.

Any Issues Encountered Across DUTs:

None.

General Recommendations:

Use the official Sampols device profile available in OrbiWAN LNS for easy device onboarding.



Additional Comments:

Test Sign-Off

Test Engineer: Alberto García Molero

Signature:

A handwritten signature in black ink, appearing to read "Alberto", with a long, sweeping horizontal line extending to the right.

Date: June 29, 2026