r26.03 Bridge E Release Notes

Hardware basis: r26.03 supports Bridge E hardware with one or two antennas.

Release date: 08.06.2026

Release Highlights

Release r26.03 focuses on stability, diagnostics, compatibility, and configuration improvements for Bridge E.
This release introduces Link State Information reporting via Bridge E Telemetry Interface (BETI), improves EchoRing MAC state signalling, handover robustness and interference resilience, and extends Bridge E support to up to 200 subnets per network. It also includes improvements to update handling, password workflows, preset handling, validation performance, and the configuration tool user interface.

The Release in Detail

New Features

- **Link State Information via BETI**
  Bridge E now supports Link State Information reporting via the Bridge E Telemetry Interface, including MAC state information.
  This provides additional device and link state information for diagnostics and monitoring.
- **Support for up to 200 subnets per network**
  Bridge E now supports up to 200 subnets per network.
  The runtime and configuration tool have been updated to support larger network configurations.

Improvements to Existing Features

- **Improved EchoRing MAC state signalling**
  EchoRing MAC state signalling has been improved.
  This provides more consistent state information for diagnostics and monitoring.
- **Improved handover and interference robustness**
  Robustness has been improved for selected handover and interference scenarios. This includes improved handling of non-EchoRing interference, encrypted EchoRing interference, invalid traffic and malformed traffic.
- **Improved update handling**
  The update process has been improved for devices running r25.10.x versions.
  This addresses update failures that could occur when upgrading from r25.10.x to newer images**.**
- **Improved password workflows in the configuration tool**
  Password handling in the configuration tool has been improved.
  This includes improved workflows for setting passwords on multiple devices, improved password input handling, and clearer error messages.

- **Improved configuration tool usability**
  Several usability improvements have been added to the configuration tool.
  These include improved device scanning feedback, clearer interface elements, improved alignment of texts and input fields, and improved handling of stored device information.
- **Updated presets and validation**
  Preset handling and validation have been updated.
  This includes updated presets, support for default traffic filters from preset files, improved timing calculations, and optimized validator queries for larger configurations.
- **Support for encrypted EchoRing diagnostics**
  Wireshark dissector support for encrypted EchoRing communication has been added.

Bug Fixes

- **DNS and NTP address handling in static IP configuration**
  Fixed an issue where DNS and NTP server addresses were interpreted with an incorrect byte order in static IP configurations.
- **ERCI TCP buffer allocation**
  Fixed an issue where the ERCI TCP message buffer was not allocated correctly.
- **Bridge port table update**
  Fixed an issue where bridge port table entries were not updated correctly if an entry was already known.
- **Configuration tool launcher behaviour**
  Fixed issues related to the portable launcher and Windows launcher behaviour.
- **Configuration tool user interface fixes**
  Resolved several user interface issues in the configuration tool, including drag-and-drop overlap, hidden development strings in narrow windows, timing validation after timing version changes, and hover information display.
- **Configuration and device handling fixes**
  Resolved several issues related to configuration and device handling, including deletion of stored entries, handling of unknown MAC addresses, login and password reset handling when importing databases, and validation of static IP addresses.

r25.10.3 Bridge E Release Notes

Hardware basis: r25.10.3 supports Bridge E hardware with one or two antennas.

Release date: 28.01.2026

Release Highlights

Release r25.10.3 builds on the RED-compliant baseline of r25.10 and the maintenance update r25.10.2. It fixes issues with default static IP handling and debug logging and updates the configuration UI with revised presets, improved password management, IP/MAC display for deployed devices, and corrected deployment behaviour for imported configuration databases.

The Release in Detail

Improvements to Existing Features

- **Updated preset configurations**
  The preset configurations in the configuration UI have been updated.
- **Improved password change for multiple devices**
  The workflow for changing passwords on multiple devices has been improved.
- **IP and MAC display for deployed devices**
  The configuration UI now displays the IP and MAC addresses of deployed devices.
- **Improved deletion of stored device passwords**
  Deletion of passwords for stored devices in the configuration database has been improved.
- **Improved change-password dialog and error messages**
  The change-password dialog and the associated error messages have been improved.

Bug Fixes

- **Default static IP after factory reset**
  Fixed an RTOS bug that did not enable the default static IP address (192.168.0.183/24) in factory-reset state.
- **Missing entries in debug journal**
  Fixed a bug that could lead to missing entries in the debug journal.
- **Deployment for imported configuration databases**
  Fixed an issue in the configuration UI that could prevent deployment when imported configuration databases were used.

r25.10.2 Bridge E Release Notes

Hardware basis: r25.10.2 supports Bridge E hardware with one or two antennas.

Release date: 15.12.2025

Bug Fixes

- The update to production now works correctly from the r25.10 initialization image.
- The configuration tool now allows updates from versions prior to r25.10 without displaying error messages.

r25.10 Bridge E Release Notes

Hardware basis: r25.10 supports Bridge E hardware with one or two antennas.

Release date: 17.11.2025

Release Highlights

Release r25.10 builds on the RED-compliant baseline introduced with r25.08 and focuses on improving usability, stability, and configuration workflows. Key updates include a hardware-based factory reset option, more robust communication between Bridge E and the configuration tool, better handling of static IP configurations, convenient quick-select presets, clearer ERCI command feedback, and fixes for issues within pyRTMF.

The Release in Detail

New Feature

- **Factory reset using hardware key**
  Bridge E now supports factory reset via a hardware key. This allows users to quickly restore the device to its factory settings without requiring access to the configuration tool, which is especially helpful in troubleshooting scenarios or when redeploying devices.

Improvements to Existing Features

- **Improved communication between Bridge E and the configuration tool**
  The communication channel between Bridge E and the configuration tool has been further optimized, resulting in a smoother configuration experience.
- **Static IP now used in configuration mode**
  When a static IP address is configured, it is now also applied in configuration mode. This simplifies integration into fixed network environments and avoids IP changes during configuration.
- **Quick-select options for preset configurations**
  New quick-select presets have been added to the configuration tool. These allow users to choose from predefined configuration sets for common scenarios, reducing setup time and minimizing configuration errors.
- **Improved display of ERCI command results**
  The presentation of ERCI (EchoRing Control Interface) command results has been improved, making responses clearer and easier to interpret.

Bug Fixes

- **Fixed help link in pyRTMF**
  Resolved an issue where the help link in pyRTMF did not correctly open the associated documentation.
- **Fixed pyRTMF crash on mismatching config-DB without migration path**
  Fixed a crash in pyRTMF that could occur when a mismatching configuration database without a valid migration path was used. The system now handles such situations more efficiently and provides more robust error handling.

r25.08 Bridge E Release Notes

Hardware basis: r25.08 supports Bridge E hardware with one or two antennas.

Release date: 01.08.2025

Release Highlights

The European Radio Equipment Directive (RED) reform introduces mandatory cybersecurity requirements for internet-connected radio devices in the EU, with a strong focus on protecting networks, user data and preventing fraud from August 2025 onwards.
This release makes Bridge E compliant with the new cybersecurity requirements introduced by the European Radio Equipment Directive (RED). It introduces mandatory encryption of wireless communication, a secured interface between Bridge E and the configuration tool, a device password concept, and a new telemetry interface.

The Release in Detail

New Features for RED

- **Encrypted wireless communication**
  All wireless communication within the EchoRing network is now encrypted. This strengthens protection against unauthorized access and eavesdropping in industrial environments.
- **Secured communication between Bridge E and the configuration tool**
  The connection between Bridge E and the configuration tool is now encrypted, ensuring that configuration data and credentials are protected while being transmitted.
- **Encrypted and authenticated ERCI**
  The EchoRing Control Interface (ERCI) now requires authentication and uses encrypted communication. Only authorized users can access control functions, supporting compliance with RED security expectations.
- **Bridge E Telemetry Interface (BETI)**
  A new Bridge E Telemetry Interface (BETI) provides a structured, secure way to access telemetry data from Bridge E devices.
- **Device password**
  Each Bridge E now supports a device password**,** adding an extra layer of protection for access to device settings and management interfaces.
- **Configuration server password**
  Access to the configuration server is now protected by a dedicated config-server password, securing central configuration endpoints against unauthorized changes.

r25.07 Bridge E Release Notes

Hardware basis: r25.07 supports Bridge E hardware with one or two antennas.

Release date: 14.07.2025

Release Highlights

- Increased network capacity: Up to 700 devices per EchoRing network.
- Improved resilience to self-interference when re-using channels.
- Sequential station startup to enhance stability in complex environments.
- Multiple updates to the configuration tool for improved usability and device detection.

The Release in Detail

Scalability Improvements

- EchoRing networks now support up to 700 devices per network, up from the previous limit of 240. This expands the range of use cases and simplifies large-scale deployments.

Interference Resilience

- Bridge E is now more robust against self-interference and channel reuse scenarios, improving communication reliability when multiple EchoRing networks operate in close proximity on the same frequency channel.

Sequential Boot

- Stations can now be configured with individual startup delays. This helps prevent communication issues during power-on in setups where multiple Bridge E devices start at the same time.

Configuration Tool Enhancements

- Improved Device Detection: The configuration tool now uses broadcast packets for device discovery, increasing reliability in networks where multicast traffic is restricted.
- Manual Station Search: A new “Manual Station Search” tool has been added to the Station Control page for discovering Bridge E devices in the local network.
- Run Without Admin Rights: The configuration tool can now be launched without administrative rights. Note: Admin rights are still required for internet connection sharing (ICS).
- Manual Network ID: The network ID, previously set automatically, can now be manually configured for advanced network setups.
- UI Responsiveness: General improvements have been made to enhance UI responsiveness and performance.

Bug fixes

- Improved responsiveness of the reliability setting in the configuration.
- Fixed an issue where incorrect units were displayed for certain timing results.

r24.11.1 Bridge E Bugfix Release Notes

Hardware basis: r24.11.1 supports Bridge E hardware with one or two antennas.

Release date: 01.02.2024

Bug fixes

- Fixed an issue causing the configuration server to not start properly on Windows 11.
- Fixed an issue causing the configuration server to appear as a blank page on startup.

r24.11 Bridge E Release Notes

Hardware basis: r24.11 supports Bridge E hardware with one or two antennas.

Release date: 16.12.2024

Release Highlights

- Throughput optimization through ethernet frame aggregation.
- Updates to the configuration user interface, including live computation of timings.

The Release in Detail

Throughput Optimization

- Bridge E now supports the aggregation of inbound ethernet frames.
- This improvement enhances support for scenarios where small and large ethernet frames are transmitted as priority traffic.

Configuration User Interface

- The configuration tool now includes live computation of resulting timings. Users can view resulting ring parameters as part of the configuration. Note: This feature is only available starting from version r24.11.
- The “Optimize for” setting has been removed from the configuration and is no longer supported as of r24.11.
- Support for custom reliability configurations has been added, allowing users to configure individual MCS (Modulation and Coding Schemes) and repetitions for control and data packets.
- The handover feature must now be explicitly enabled using a new toggle switch and will no longer activate automatically when adding new subnets.

Bug fixes

- Fixed an issue where the landing page of the configuration tool appeared empty in certain scenarios on Windows systems.

r24.05.1 Bridge E Bugfix Release Notes

Hardware basis: r24.05.1 supports Bridge E hardware with one or two antennas.

Release date: 01.02.2024

Bug fixes

- Fixed an issue causing the configuration server to not start properly on Windows 11.
- Fixed an issue causing the configuration server to appear as a blank page on startup.

r24.05 Bridge E Release Notes

Hardware basis: r24.05 supports Bridge E hardware with one or two antennas.
Release date: 15.05.2024

Release Highlights

- Bridge E now supports MAC learning
- Improvements to the configuration User Interface

The Release in Detail

MAC learning

- Bridge E now supports automatic learning of mac-addresses of connected devices.

Configuration User Interface

- The configuration UI has been updated to allow dismissing and recovery of dismissed warnings.
- The configuration selection in plant configuration mode has been updated to improve usability.
- The configuration now allows to assign individual tx-power to Bridge E devices. The user must explicitly select to override the inherited TX-power from the subnet configuration.
- Full support for all ERCI-commands has been added and is available on the “station control” page.

Windows launcher

- The error message in case ICS cannot be enabled has been updated to provide more helpful information to the user.

Bug fixes

- Unconfigured devices are now properly displayed (previous error-message has been updated / removed).
- Robustness of update post-processing in environments with poor internet connection and / or unreliable NTP server has been improved.

r23.07 Bridge E Release Notes

Hardware basis: r23.07 supports Bridge E hardware with one or two antennas.
Release date: 13.09.2023

Release Highlights

- Handover deployment bug has been fixed for newly created as well as imported databases.
- Several UI/UX improvements have been introduced along with several bug fixes.

The Release in Detail

IP address calculation & display

- Inherited IP addresses will now be properly displayed in the UI (including information where it is set).
- IP collisions will be shown for assigned static IP addresses and nameserver / timeserver / gateway addresses.
- IP collision error messages are now aggregated.
- The “Empty IP settings text” was removed for “0.0.0.0” addresses.
- Device Settings: When DHCP Client option is enabled, the Static IP input field is now disabled.
- Moved Backbone IP and Backbone Port settings into Plant-wide settings.

Plant configuration

- Plant configurations can now be copied.
- Plant configurations can now be renamed.

UI updates

- Multiple Bridge E devices can now be added at once.
- Long names and descriptions are now truncated and will be fully displayed on mouseover.
- Moved buttons for network and subnet.
- Adapted configuration stack minimization option.
- Renamed "pyRTMF" to "R3 Configuration Server" in the web interface.
- When enabling “Relay Station” option set Capacity Factor to 0, when then disabling again set to 1.
- Config hash display fixed for small window sizes.
- Configuration is now properly displayed in all browsers.
- In “Station Control” tab, the duplicates will no longer be shown in the IP drop-down menu.
- Fixed UI error in drop-down list of plant names.
- Fixed coloring and displaying of long site names, closes drop-down correctly.
- Fixed partially hidden “Downloading…” text when updating.
- Fixed a bug where leaving Plant Configuration with configuration stack open resulted in UI not displaying correctly when entering Plant Configuration again.

Bug Fixes

- Fixed some stations not being unpaired correctly.
- Warnings and errors are correctly displayed for devices again.
- Fixed drop rule for handover multicast traffic not automatically added when using new database.

r22.07.1 Bridge E Release Notes

Hardware basis: r22.07.1 supports Bridge E hardware with one or two antennas.
Release date: 25. Nov. 2022

Release Highlights

This is a bug-fixing release.

The Release in Detail

Description

- In r22.07 pyRTMF allowed for a maximum capacity factor of 10 PTTs. This has now been fixed to the specified and documented capacity factor of 20 PTTs per station.
- In r22.07 only ERCI v3 is supported. To be compatible with existing installations, we need to support ERCI v2 as well.

Known Issues

Portable mode of the pyRTMF Windows application does not correctly find the executable.
Workaround: start pyrtmf.exe manually, namely without GUI and it will still work as expected even in portable mode.

r22.07 Bridge E Release Notes

Hardware basis: r22.07 supports Bridge E hardware with one or two antennas.
Release date: 16. Sept. 2022

Release Highlights

Performance

- 2-3 sec fast boot*)
- Data traffic convergence: QoS with 5 priority queues
- Ultra reliable communication: Packet Loss Rate (PLR) **targeting 10^{-7} and below**
- Real-time API (ERCI): Seamless roaming (hand-over)
- Hardware flexibility: Bridge E devices with one or two antenna ports

*) with static IP, add IP address acquisition time for use with DHCP server

Productivity

Plant UI for configuration and maintenance of large-scale networks - now including the new Bridge E Configuration Server – an application running under MS WINDOWS (aka pyRTMF).

The Release in Detail

Bridge E Hardware

Bridge E is designed and certified for operation in 5GHz bands.
Bridge E is now available with one or with two antenna ports. Switching between both ports can be controlled through ERCI at run-time.

Configuration

- Selection of antenna to be used is controlled via ERCI
- Initial antenna can be configured via config <cfg_id> <ring_id> <ant_id>
- Antenna to be used after handover via ring <ring_id> <ant_id>
- Antenna can be switched during runtime via antenna <ant_id>
- Host will perform ERCI argument checks to prevent switching to an antenna that is not supported by the hardware (check is only based on flashed wlconf)

Regulatory domain

The regulatory domain in which Bridge E will operate is set at package build time. User cannot change it anymore. Although the option to change it still exists, it will not have an effect.

Configuration

- Once a node is paired it needs to explicitly be un-paired before disconnecting it.

Configuration and Productivity

The new Bridge E Configuration Server is now running under Windows on customer-provided hardware. IT replaces the previous configuration tool (pyRTMF) that was shipped on dedicated R3-provided hardware.
Its Plant User Interface - Plant UI for short - offers several productivity functions streamlining configuration, bring-up, operation and maintenance of large Bridge E based networks.

Bridge E Stack

Network and Subnet configuration

Expansion in network size

- Increased maximum number of supported networks to 20
- Increased number of supported subnets per network to 24

Subnets with more flexibility

- Channels can now be reused in the same network for multiple subnets
- Power can be adjusted for each subnet individually even if channel is reused

Hardware context
The transceiver chip used for Bridge E allows for concurrent storage of three sets of channel calibration parameters. Changing those settings requires radio channel calibration. During calibration (1-2 seconds) no active data traffic could be supported.
This is why the number of unique channels per subnet must be less or equal to 3.

Examples

- Subnet A 153, B 157, C 153, D 157, E 161, F 157 is accepted.
- Subnet A 153, B 157, C 161, D 165 is NOT accepted (4 unique channels in total).

Switching between pre-calibrated channels is relevant for seamless roaming – fast roaming without any packet loss.

Quality of Service (QoS)

The release comes with expanded and more flexible QoS functionality for Bridge E.

Broadcast Repetition Flag
Broadcast (BC) repetition flag only affects broadcast frames that matches priority 1 filters. Multiple traffic filters with priority 1 could be added.

If enabled, priority 1 BC packets will be repeated **once**

- The first priority 1 BC packets will be repeated in the **next TTRT**[*)]
- If there is **more than 1** priority 1 BC packet per rotation and station, all other packets will be put end of queue, and therefore possibly repeated within the **same TTRT**

Enabling BC repetition flag will reduce the total amount of available frame buffers in FW[**)]

- If the payload is configured (close to) maximum of 1.500 Bytes, it might not be possible to enable BC repetition due to lack of available packet memory in the FW

[*)] TTRT = Targeted Token Rotation Time, or short: Rotation
[**)] FW = Firmware (of the transceiver chip)

Extended number of Priority Classes
Maximum supported number of different priorities has been increased to 5 priority classes in total. Priority class numbering shall start with priority 1 and is required to be contiguous. There are no gaps allowed (e.g. not allowed 1,3,4 or 2,3,4).
If a configuration is used, which requires handover support, the drop-rule for anchor multicast traffic is automatically added based on „Backbone IP" settings.
Bridge E configuration server will not auto-add drop-rule if it has been already manually entered.

Custom queue size
!!! Setting up custom queue sizes requires expert knowledge and experience!!!

Setting custom queue sizes allows users to specify the number of queue slots per priority class (not for each priority filter entry, though) and the best effort queue.

- If feature is used, number of slots **for each used priority class** has to be specified (non zero)
- If more slots than available are requested, deploy will fail.
- If less slots than available are requested, EchoRing will evenly distribute leftover slots among the queues.

External Runtime Control Interface (ERCI)

ERCI will now be started for all image types and operational modes. However, the available feature set varies. See Bridge E User Manual for details.

Configuration

- If you do not want to install via poetry (or cannot), client can be started via `python3 -m r3erci` in r3erci folder

Fast Boot
The boot process has been streamlined and accelerated. With a static IP address (see section below) its completion takes 2-3 seconds. For configurations with DHCP server the IP address acquisition time needs to be added to the duration of the boot process.
Bridge E operational mode is now configured and a Bridge E configuration server in the network will no longer stop devices from starting EchoRing!
Devices no longer wait for a Bridge E configuration server to decide which mode to boot into. Instead a ConfigMode flag in the device settings defines the intended mode. This flag is cleared on a successful config deployment by Bridge E configuration server and can be manually controlled by the user through ERCI.
Devices will now boot into one of three modes: ConfigMode, Deployment, or FallbackMode. The init-image will always boot into the ConfigMode

ConfigMode
In this mode devices do the following:

1. DHCP request to get IP address (on fail go to error state).
2. Start ERCI command interface (on fail go to error state).
3. Request local time via NTP (fail allowed).
4. Start infinite Bridge E configuration server messages listening loop.

Deployment
In this mode devices do the following:

1. If static IP address set, apply it. In other case do DHCP request and wait for IP address (on fail go to error state).
2. Check wireless driver state. If wireless driver is not running stop deploying config and go to error state.
3. Detect and load first valid configuration setting (on fail go to error state).
   a. If one subnet and one configuration set configured, apply configuration and start llc (on fail go to error state).
   b. For anchor rule, start handover service (on fail go to error state).
   c. For non-external relay rule, start bridging traffic between ethernet and EchoRing (on fail go to error state).
4. Start infinite loop, wait for user ERCI control commands.

FallbackMode
In this mode devices do the following:

1. DHCP request to get IP address (on fail go to error state).
2. Start ERCI command interface (on fail go to error state).
3. Start infinite loop, wait for user ERCI control commands.

Flexibility: Static IP vs. DHCP

- All devices can now be configured individually to either use DHCP or a static IP configuration when deployed.
- While deployed devices use the user IP configuration, DHCP will be always used in the ConfigMode.
- In the case a deployed device is not able to use any part of the configuration, it will go to the new FallbackMode where DHCP will be used.

Handover Flag
Handover (HO) flag has been removed from the graphical user interface (GUI) for consistency.

Discontinued

Performance Analyzer
The performance analyzer tool including its R3-provided hardware is no longer available.

Config Server Hardware
Config Server Hardware is no longer available. Instead, a configuration tool running on customer-provided hardware under Windows is being made available (see above).

Config Server under Linux
The Bridge E stack does no longer support its configuration tool (pyRTMF) running under Linux.