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.