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		Reference	Radio 4461

Radio 4461 B77D Technical Circuit Description - SW Upgrade Security

Exhibit 12 – Technical Circuit Description, SW upgrade and control security procedure for Radio 4461 B77D:

FCC ID: TA8AKRC1614477

IC: 287AB-AS1614477

HVIN: AS1614477

Radio Product: KRC 161 4477/31

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1 SW upgrade and control security procedure

1.1 Arrangements and procedures to maintain granted radio characteristics by software

General

The Radio Unit requires license and will be operated by professionally operators (holders of the frequency license).

Software upgrade capability will be primarily provided by grantee via secured internet connection; either directly downloaded installed from the grantee or by the operator.

Software upgrades may be provided to the radio by the Digital Unit over a proprietary CPRI interface (remote) and are encapsulated within a special "Load Module" container where the software is compressed and formatted. Download a new "Load Module" containing the SW, FPGA images and databases using the "Signed Soft Ware" functionality to validate.

Ericsson as Grantee will continue to be the responsible party to ensure compliance.

Software Configuration Restrictions

For the most part, the Radio Unit is agnostic to the modulation type and transmission standard as this is controlled and performed by the baseband signal processing. The enforcement of frequency range limits is provided through the use of fixed HW filtering, and within these limits permitted only within the restrictions imposed on the Radio Unit by external modules through licensing keys functionality controlled through SW means. Output power is limited by HW limitations as well as through licensing keys restrictions imposed on the Radio by external modules through SW means.

- SW may only place RF signals within the boundaries (frequency range) imposed by the fixed HW Filters. Within those limits, parameters related to carrier center frequency and frequency response may be adjusted through SW means. Certain functions such as MIMO, MSR, Digital Pre-Distortion and clipping reduction algorithms may be modified or updated during the process of a SW upgrade. Such functionality is not released without estimation with respect to grant authorization, if needed permissive change class II or application a new FCC ID will be done.
- With respect to updates provided through the CPRI interface by the Digital Unit (remote), a mechanism named Signed Software is used to ensure the integrity and validity of the software before the update process is started.
- Through the CPRI interface between the Digital Unit and Radio Unit, several levels of security are in place to prevent unauthorized access through the network.

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1.2 Arrangement of license keys

A Radio Unit has a small initial capacity basic feature enabled. Higher capacity must be ordered. This required licenses and a license keys must be installed to have the possibility to use the particular feature. No new software has to be installed. It is not possible to order and have access to features which not are approved.

Ericsson provides several types of licenses:

Capacity licenses

General hardware licenses

Regulate RBS capacity

Consist of software based and hardware-based limitations.

Hardware Activation Codes (HWAC) for hardware actions.

Examples of optional capacity licenses:

Radio access technology

Channel Bandwidth

Output power (not possible to override maximum output power)

Downlink capacity

Uplink capacity Number of connected users Etc.

Feature licenses

Feature licenses enable an optional feature to be activated. The feature must be subsequently activated via parameters

Examples of optional feature licenses:

Dual antenna DL Performance Package (i.e. 2x2 MIMO) 64-QAM DL

ANR (Automatic Neighbor Relations) Etc.

There are also feature demonstration style licenses

Trial licenses