ACKSYS
COMMUNICATIONS & SYSTEMS

Addendum to DTFRUS054 and DTUS070 for
RailBox/24

Contents

I.   Introduction

The RailBox/24 features a Cellular Radio Network interface and a Position Acquisition System.

A.   Cellular Interface

The radio interface supports UMTS and LTE (E-UTRAN) connections to a compatible mobile phone network:

- Main (**mandatory**) antenna
- Diversity (optional) antenna
- Two SIM card slots located inside the case
- State / Activity / Signal strength LEDs.

B.   Position Acquisition System

The GNSS (Global Navigation Satellite System) provides geographical position determination:

- One GNSS antenna
- GPS State LED
- Supports simultaneous satellite constellations: GPS, Galileo, GLONASS, Beidou.

II.   Addendum to the RailBox quick start guide DTFRUS054

The quick installation guide DTFRUS054 for the "WiFi-only" RailBox models applies to the "Cellular" and RailBox/24 models, except for the differences underlined below.

Antennas connectors

Cellular Main

Cellular Diversity

GNSS

Sample GNSS antenna

Display LEDs

Cellular Signal Strength Bargraph

Cellular Activity

Cellular State

GNSS State

LED meaning

LEDs	Display	Meaning
Cellular Signal Strength Bargraph	0, 1, 2, 3 or 4 LEDs are lit depending on reception conditions	Shows quality of radio signal received from the attached operator base antenna
Cellular Activity	Off	No transmission
	On / Flashing	Transmission occurs
Cellular State	Off	Disabled by configuration
	Flashing	Searching a base antenna
	On	Attached to base antenna
GNSS State	Off	Disabled by configuration
	Flashing	Searching satellites
	On	Sync'd to satellites

Radio characteristics	
Radio bands	B1/B3/B5/B7/B8/B20@FDD LTE; B38/B40/B41@TDD LTE; B1/B5/B8@WCDMA; B3/B8 @GSM
Maximum bitrates (Mbps)	LTE Cat 4 LTE-FDD: Max 150 (DL)/ Max 50 (UL) LTE-TDD: Max 130 (DL)/ Max35 (UL) DC-HSPA+ : Max 42 (DL)/ Max 5.76 (UL) WCDMA : Max 0.384 (DL)/ Max 0.384 (UL) EDGE : Max 0.2368 (DL)/ Max 0.2368 (UL) GPRS : Max 0.0856 (DL)/ Max 0.0856 (UL)
Antenna connectors	2xQMA
SIM slots	2xMicroSIM

SIM card insertion

1) **Unplug the power supply**
2) Unscrew the top 4 bolts of the box and remove the cover
3) Locate the two flat SIM slots near the lights for WiFi 1 (border side)
4) Choose one slot; they are labeled on one side (near the center of the device PCB)
5) To open the slot: make the slot cover slide by pushing it gently towards the border side
6) Now the cover can be lifted from the center side, around the axle which is at the border side
7) Place the SIM card, gold contacts facing down, cut corner towards the border side
8) Lower back the slot cover and push it towards the SIM slot label, you should hear a faint click
9) Put back the cover in place and screw the 4 bolts
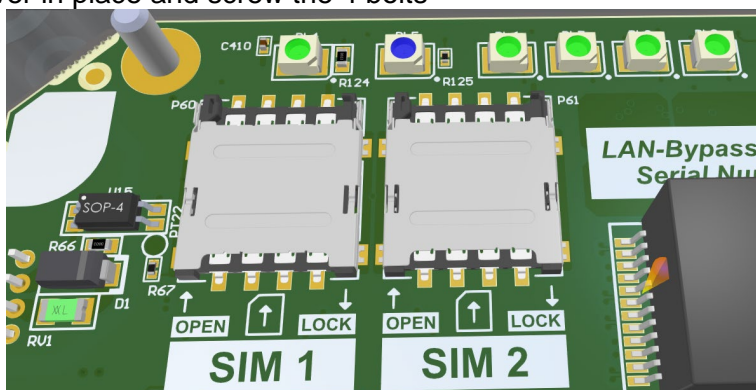
GNSS characteristics	
Satellite constellations	GPS, GALILEO, GLONASS, BEIDOU (automatic selection)
Sensitivity	-157 dBm (-146 dBm at cold start)
TTFF (open sky)	35s (cold start), 26s (warm start)
Accuracy (CEP)	Horizontal : 1.5 m (5 feet) Vertical : 20m (66 feet)
Antenna connector	1xQMA

III. Addendum to the WaveOs User Guide DTUS070

A. Cellular interface

The Cellular Radio interface is disabled by default. It is an IP-only interface. The operator sets an IP address using DHCP. The interface cannot be inserted in a layer 2 Bridge.

There is only one page of configuration, which can be reached either by

- SETUP→Physical Interfaces→Cellular
- Or SETUP→Network→Cellular

There are 5 tabs:

1. General setup

Enable Interface	Cellular interface is disabled by factory settings. Check this box to use the interface.
Network description	Friendly name of the interface.
Protocol	Read only field. Only DHCP for IPv4 is supported.

2. Cellular settings

Default to SIM card 2	Check to use SIM2 slot. Uncheck to use SIM1 slot.
Replace default route	Check this box to override configured default route using the gateway acquired from DHCP on the cellular interface.
Use peer DNSs	Check this box to override configured DNS using the ones acquired from DHCP on the cellular interface.

3. SIM1, SIM2

CELLULAR

| General Setup | Cellular Settings | SIM 1 | SIM 2 | Advanced Settings |

SIM card 1 PIN code   ••••   A ⟳ •
Enter the correct SLOT 1 PIN code or you might lock your sim card!

SIM card 1 access point (APN)   free
Required except for LTE-only connections

Authentication protocol   SIM only ▼

PIN code	SIM card PIN code. **Warning**: using the wrong PIN **may lock out the SIM card** after two tries.
Access point (APN)	Access point name, needed for UMTS fallback.
Authentication protocol	Authenticate to operator using SIM IMSI, or use legacy PAP/CHAP with user and password.

4. Advanced settings
These settings must not be used for normal operation.

There is a STATUS→Cellular page which gives some information after the interface is enabled.

DEVICE INFO
NETWORK
WIRELESS
CELLULAR
SERVICES
LOGS

CELLULAR STATUS

Warning: scanning will break established connections which use that radio.

Cellular interfaces

RADIO	SIM STATE IMSI IMEI MODEL	OPERATOR MCC/MNC	ATTACHED	BASE STATION LAC/CID	ACCESS TECHNOLOGY	INFRASTRUCTURE BAND CHANNELS	RSSI	BER	SCAN
Cellular	Password accepted 208101085832690 861107030023924 EC25 rev A2.8 EMEA	F SFR 208/10	home	48004 / 1788929	gsm FDD LTE	LTE LTE BAND 7 ARFCN: 2825	-75	0	Scan

Model	The last part gives the supported country area.
MCC/MNC	Operator's international code.
Attached	Home means attached to a base station managed by the SIM provider. Roaming means attached to a compatible operator.
LAC/CID	Base station Local Area Code and Cellular cell ID.
ARFCN	Absolute Radio Frequency Channel Number.
RSSI	Signal quality estimator.
BER	Bit Error Rate estimator; estimated number of errors per 10000 bits (see 3GPP TS 45.008)

The STATUS→Network page informs about IP interfaces, including Cellular.

CELLULAR						
IP CONFIGURATION						
IPv4: 100.71.223.102 Netmask: 30 MTU: 1500						
DHCP info: Lease time: 7200s						
DNS server: 172.20.2.10 172.20.2.39						
GRAPH	**PHYSICAL INTERFACE**	**MAC ADDRESS**	**TX COUNT (IN BYTES)**	**RX COUNT (IN BYTES)**	**INTERFACE MODE**	**MTU**
📊	Cellular	16:ed:07:99:92:9f	647220	646632	Operator (home): F SFR SIM: Password accepted	1500

B.   Position Acquisition System

The GNSS (Global Navigation Satellite System) service is disabled by default. It combines the position acquisition hardware and a well-known server named "gpsd" (see http://www.catb.org/gpsd/).

There is one page for configuration: SETUP→Services→GNSS Agent.

PHYSICAL INTERFACES	**GLOBAL NAVIGATION SATELLITE SYSTEM**
VIRTUAL INTERFACES	
NETWORK	Activate the embedded GNSS receiver and configure the gpsd server
VPN	
BRIDGING	**GPSD**
ROUTING / FIREWALL	
QOS	**Enable** ☑ ⓘ Allows internal services to use the GNSS
SERVICES	**Serve external clients** ☑ ⓘ Allows external users to connect to this gpsd server
ALARMS/EVENTS	**Listen port** 2947
CONN. TRACKING	ⓘ Port on which gpsd will listen
COUNTERS GRAPHS	**Position logging period** 0
DHCP / DNS RELAY	ⓘ Number of seconds between positioning records in the system log (at 'info' level); 0 or empty to disable
DISCOVER AGENT	**URI for map link (Device Info page)** https://www.google.com/maps/?q=%1,%2
GNSS AGENT	ⓘ '%1' and '%2' in the URI are replaced by latitude and longitude in signed dotted-decimal notation, e.g. '-48.000000'
SNMP AGENT	URI must not contain doublequotes
VRRP	Any string missing a column ':' will disable the link
WEB SERVER	

Enable	Enable use of the GNSS antenna.
Serve external clients	Enable devices on the LAN to query the position information from the gpsd serve using its published interface (see http://www.catb.org/gpsd/client-howto.html) or existing clients like "gpsmon". If not checked, the position is only available in the following places: • STATUS→Device Info page • SNMP in OIDs acksys/serviceStatus/ss-gnss • System log (at "info" log level)
Position logging period	Delay between two position samples written to the System log. "0" to disable logging.
URI for map link	The STATUS→Device Info page uses the position data to set up a link. The default link is to Google Maps. You can change this to any target URL, using %1 and %2 as latitude and longitude parameters. URL missing a column disables the link.