

FalcoNet v1.1

Hardware User Guide



Revision 1.1, January 2023

PN: CG-1227-R01

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Introduction

The purpose of this document is to provide information regarding the FalcoNet including connectivity, components, and standard troubleshooting for the end user.

Safety guidelines

	<p>The installed location of the unit must be clear and ventilated. Keep from dust, moisture etc. Do not place near heat sources or in direct sunlight</p>
	<p>Align cable connectors carefully and fasten them tightly, but do not apply excessive force.</p>
	<p>Do not exceed temperature limit.</p>
	<p>Failure to comply with the following guidelines may cause the unit to overheat and may be dangerous:</p>
	<p>Air temperature around the unit should never exceed 45°C (113°F).</p>
	<p>The unit dissipates a lot of heat. Never block or cover the unit's ventilation slots and do not insert any objects through them. Never block or cover fans or heat sinks.</p>
	<p>Always allow at least 10 cm clearance in front of and behind the ventilation slots for free air circulation.</p>
	<p>If fans do not operate properly, immediately stop using the unit.</p>
	<p>If unit is installed in closed cabinet provide ample ventilation to ensure sufficient air flow. Test air temperature around unit after 1 hour and 10 hours of continuous operation. Verify that air temperature surrounding unit does not exceed the maximum 45°C (113°F)</p>
	<p>The unit uses high voltage while operating. However, power input circuitry may still be at high voltage even while the unit is on stand-by. Disconnect the power cable and any batteries to completely remove dangerous voltage from the unit.</p>

Overview

FalcoNet is an active system that provides flexibility and operational agility as it provides simplified installation, maintainability and support.

General Design concept

NOTE: For reference the height of the drawers (modules) are referred to with the term “U” where a 1U drawer is approx. 4.5 cm in height , therefore a 2U drawer is approx. 9cm

The general design concept addresses the following points:

- + Technology agnostic: Full SDR
- + Multi-BTS: 9 BTSs in a single chassis
- + Deployment: Quick & easy removal of the BTS unit
- + Scalability: 2 systems can be managed from the same workstation

General solution specifications

As the FalcoNet system can be configured in many different combinations the below specifications are for the stated generic solutions

The general FalcoNet specifications are listed below:

- + Voltage input 36v
- + Power: Typical 800Watt - Max 1100Watt
- + Full System Dimensions: 4U x 19” x 600mm (H x W x D)
- + Brain Unit Dimensions: 153 x 386 x 267mm (H x W x D)
- + Total Weight 37Kg
- + Weight of GUL Board is 700gram
- + Weight of FalcoNet BU is 11Kg (with 9x GUL boards)
- + Weight of MPA-S is 26Kg

Supported bands

The current supported bands are listed below

Band	Name (MHz)	Supported for FalcoNet
GSM Band 2	1900 PSC	Yes
GSM Band 5	850	Yes
UMTS Band 2	1900 PSC	Yes
UMTS Band 4	2100AWS	Yes
UMTS Band 5	850	Yes
LTE Band 2	1900 PSC	Yes
LTE Band 4	2100AWS	Yes
LTE Band 5	850	Yes
LTE Band 12	700a	Yes
LTE Band 13	700c	Yes
LTE Band 14	700PS	Yes
LTE Band 17	700BC	Yes
LTE Band 25	1900+	Yes
LTE Band 26	850+	Yes
LTE Band 66	2100AWS3	Yes
LTE Band 71	600	Yes
5G Band 71	600	Yes

Hardware configuration

This section explains the different modules used in the FalcoNet solution

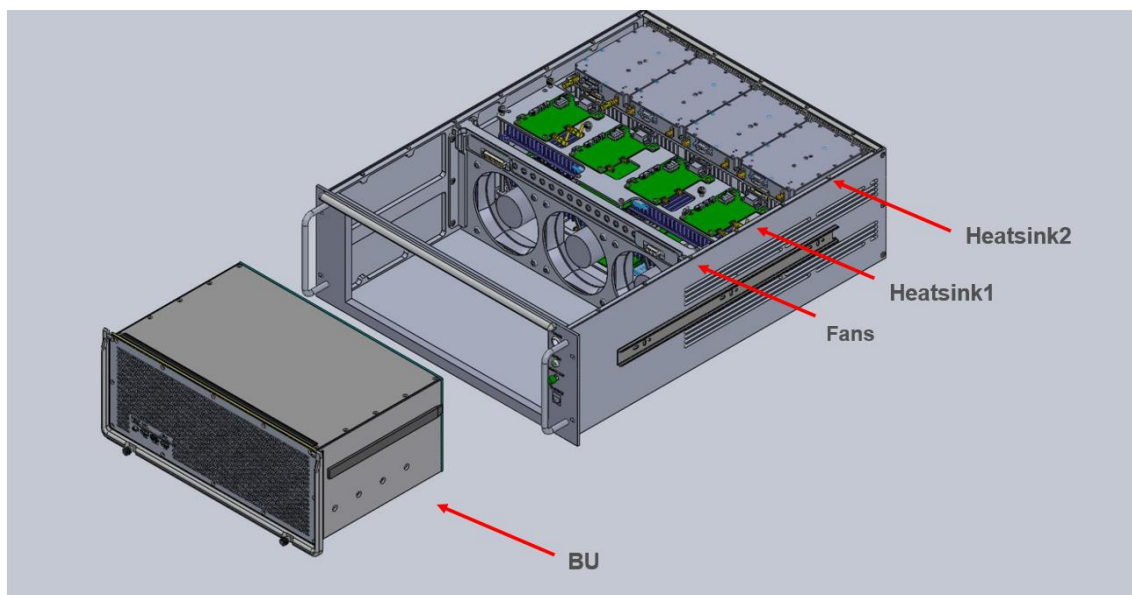


Figure 1: FalcoNet system

The FalcoNet system consists of 2 units

1. Brain unit (front panel)
2. PA unit (rear panel)

The front panel denotes the front of the system (i.e. Brain Unit) and the rear panel denotes the rear of the whole system i.e. after the PA unit.

These panels' interfaces are described later in this guide

Brain unit components

- + Power on/off switch
- + LED off switch
- + LED statuses
- + GUL (GSM, UMTS, LTE, 5G) transmission boards
- + GPS

PA unit components

- + Fans
- + MPA
- + Heatsinks

FalcoNet Unit interfaces

BU Front Panel

Interface Function	Panel location	Connector type	Remarks
On/Off switch	Front		
LED Off switch	Front		
LED Status	Front		
2 x Ethernet	1 x Front, 1 x Rear	RJ45	
Main Power Input Connector	Rear	TE 4-1609075-6	
Circuit Breaker	Rear		50A
3 x TX Connectors	Rear	Quick N-Type (QN)	9 x BTS's
1 x RX	Rear	N-Type	
1 x NWL	Rear	Quick SMA (QMA)	
GPS	Rear	D-SUB (3 PIN)	

Brain unit (BU) module

The below picture show the BU front panel .

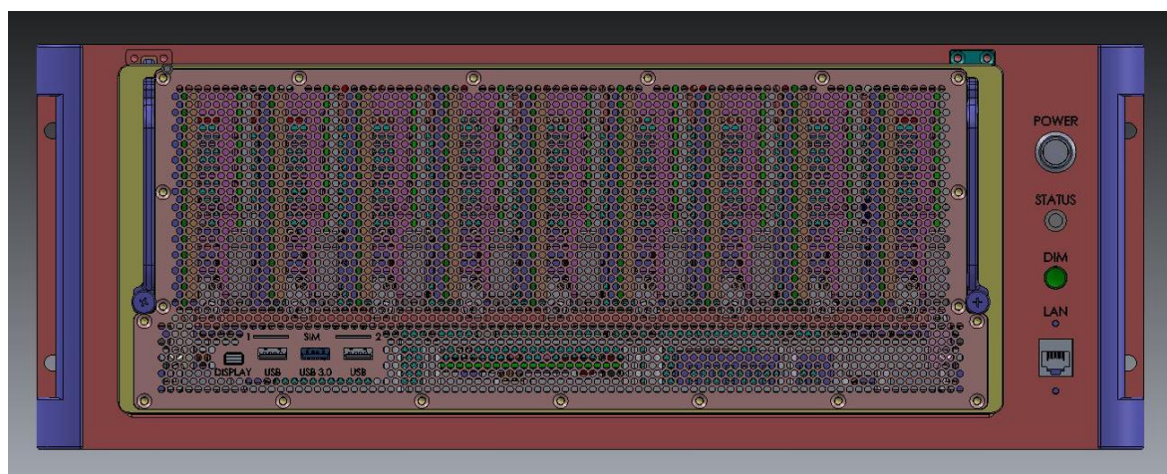


Figure 2: BU front panel

Connection table

No.	Interface	Designation	Description
1.	Power	System ON/OFF	Push button
2.	Status	System status	LED
3.	DIM	Dimming switch	Push Button
4.	LAN	LAN connectivity	Standard RJ45 connection
5.	(*) Display		
6.	(*) USB x 2		
7.	(*) USB 3.0		
8.	SIM x 2	SIM card connectivity	SIM card sockets x 2
	+ (*) Internal PC option only		

BU front panel interface details

The front panel interfaces are shown below and described in the following section.

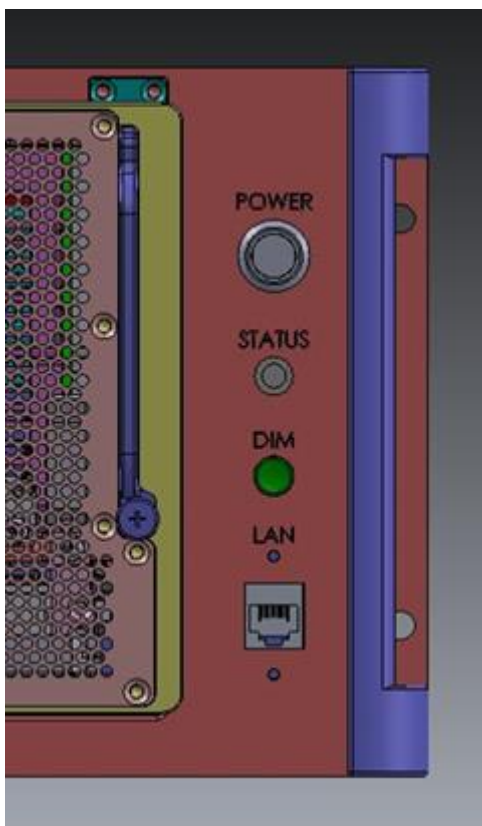


Figure 3: Front panel interface options

BU front panel system indications

Component	Function	Action
Power Button	On/Off	Short press <1 sec
Power Button	Forced Off	Long press 5 sec
DIM	Units LEDs On/Off	Toggle
Status LED	<p>Normal status</p> <ul style="list-style-type: none"> • Yellow Light - from Power up until the GUL cards are ready for Booting. • Green Light – GUL Cards has started booting. • Red Light – System is transmitting • Blinking Yellow Light – system malfunction • Blinking Red Light – System Shutdown 	
Status LED Alarms	<p>Yellow light not switching to green options:</p> <ul style="list-style-type: none"> • No GUL is present • GUL are disabled by the CSI board • CANbus between BU and MPA-S is not functional <p>Blinking Yellow light options:</p> <ul style="list-style-type: none"> • Temperature Problem. • Fan Alarm • VSWR Problem (No Antenna) • SW Issue (FalcoNet Manager) 	
Ethernet connection	Used to connect the dedicated FalcoNet laptop	

PA Unit (PA) Rear Panel

The below picture shows PA real panel.

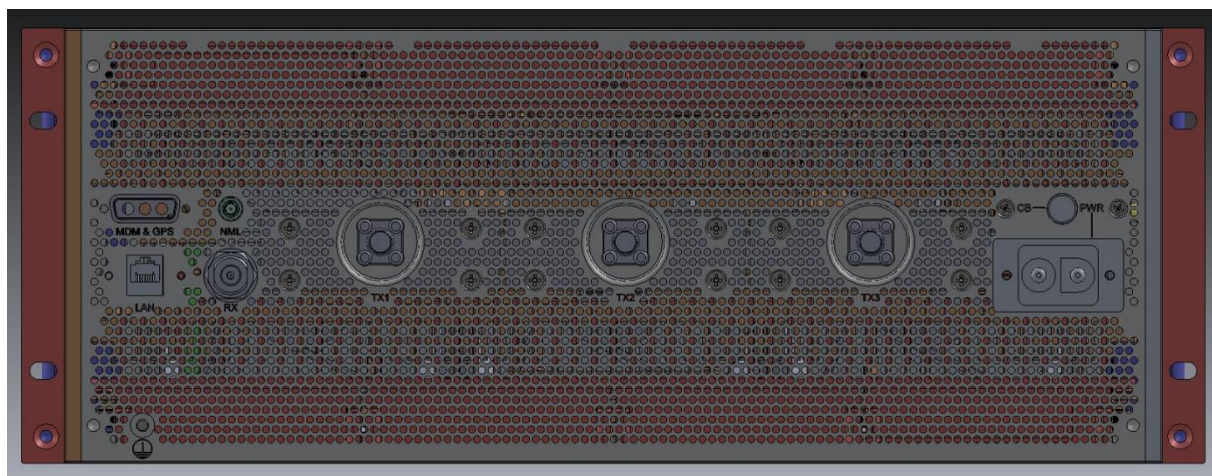
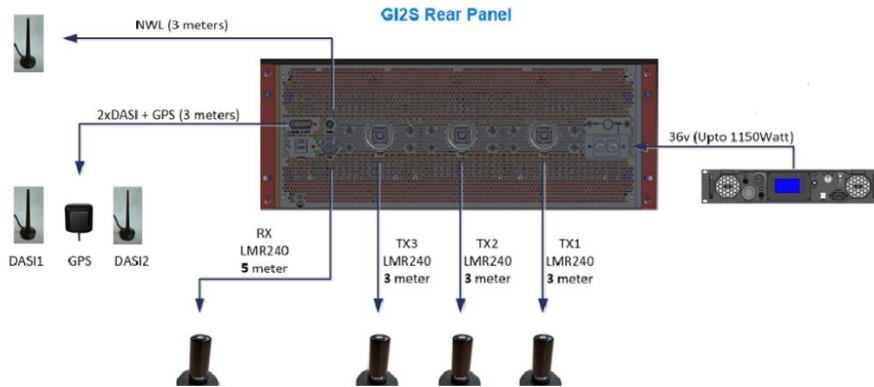


Figure 4: PA unit

Connection table

No.	Interface	Designation	Description
1.	GPS	To external GPS antenna	SMA female
2.	NWL	To external Omni antenna	QMA female
3.	LAN	LAN connectivity	Standard RJ45 connection
4.	RX	To external antenna	N-Type
5.	TX1	To external antenna	Quick N-Type (QN)
6.	TX2	To external antenna	Quick N-Type (QN)
7.	TX3	To external antenna	Quick N-Type (QN)
8.	CB	Overcurrent protection	Circuit breaker
9.	PWR	Main Power Input Connector	

Omni Antennas RF installation and specs



Electrical Specifications

Frequency, MHz	617-698	698-960	1700-2200	2300-2700	3300-3800	3800-4000
VSWR ⁽¹⁾	<2.8:1	<2.0:1	<1:8:1	<1:5:1	<2.0:1	<2.8:1
Peak Gain ^(1,2,3) , dBi	3	2.5	4	3	1.5	1.5
Efficiency ^(1,2) , %	80	70	75	67	38	45
Polarization	Vertical					
Nominal Impedance, Ohms	50					
Max Power, W	100					

(1) Including Laird NMOHPC connector and 20 cm LMR195 cable; on a 70-cm circular ground plane

(2) Average

(3) Gain measurement uncertainty is ±0.5 dBi

Environmental Specifications

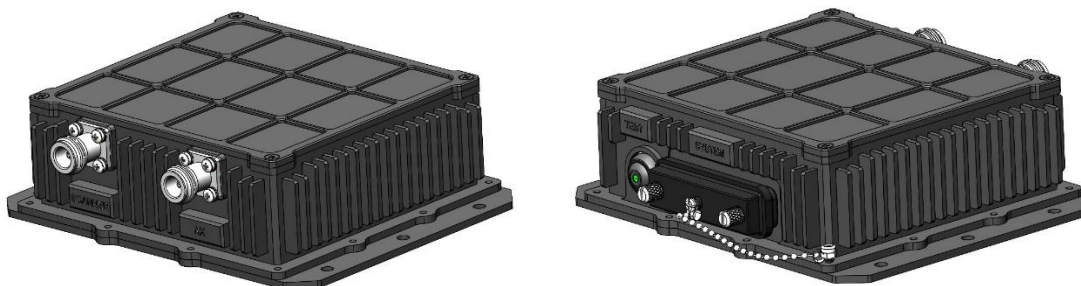
Operating Environment	Outdoor
Operating Temperature, °C	-40 to +85°C
Storage Temperature, °C	-40 to +85°C
Material Substance Compliance	RoHS

Mechanical Specifications

Dimensions H x D, mm	83 x 37
Weight, g	77
Connector Type	NMO

CUTTA V2 module

This module is used for improved system RX performance in all configurations. It is powered over the RF cable itself and can optionally be connected to LAN for more advanced control.



Specifications

Parameter	Value
Out of band rejection	>30dB (depending on band)
Max output level	5dBm (depending on output routing)
Gain @ all bands	10-20dB
Noise figure @15dB Gain	4.5-8.5dB 5.5-15.5dB (B14 – NA variant)
Power consumption	12W (Max)
Environmental	
Operating Temperature Range	-10°C to 55°C
Storage Temperature	-40°C to 85°C
Dimensions	170mm x 130mm x 40mm (L x W x H)
Weight	1.2kg

Please refer to the CUTTA V2 product spec for more information.

DPSU-S (AC > DC converter)

The DPSU-S (Desktop Power Supply Unit) is designed to be used as a standalone unit where it can be placed next to the GIS2



Figure 5: DPSU-S unit

No.	Interface	Designation	Description
1.	36VDC	To FalcoNet	Single multi-pin connector
2.	19VDC	To FalcoNet M (if applicable)	Single multi-pin connector
3.	CB1	36V supply	35A Resettable circuit breaker (to be used only in the event of a fault)
4.	CB2	19V supply	20A Resettable circuit breaker (to be used only in the event of a fault)
5.	AC Power	From AC power	Standard power input connection

Operation guidelines

Before using the units, make sure that you have read all safety guidelines.

Do not exceed temperature limit.

Failure to comply with the following guidelines may cause the units to overheat and may be dangerous:

Air temperature around the units should never exceed 45°C (113°F) or be below 0°C (32°F).

Each unit dissipates a lot of heat. Never block or cover the unit's ventilation slots and do not insert any objects through them. Never block or cover fans or heat sinks.

Always allow at least 10 cm clearance in front of and behind the ventilation slots for free air circulation.

If fans do not operate properly, immediately stop using the unit.

If the units are installed in closed space provide ample ventilation to ensure sufficient air flow. Test air temperature around the units after 1 hour and 10 hours of continuous operation. Verify that air temperature surrounding the units does not exceed the maximum 45°C (113°F).

Operating the FalcoNet system

1. Connect system as per system connection diagram.
2. Verify that the FalcoNet is switched **OFF**.
3. Turn on AC/Vehicle power supply (whichever is applicable)
4. Turn **ON** the FalcoNet system.
5. Verify that the system status LED on the front panel is **ON** and the LED is not showing any malfunction i.e. blinking yellow light).

Troubleshooting

In the event of failure, malfunction or suspicion thereof, follow the procedure below to isolate the problem.

Problem Description	Display warning	Solution
Unit's main On/Off switch is on. No LED lights	No LED lights	<ul style="list-style-type: none"> + Verify the unit is not in DIM mode, by pressing the DIM button for 2 seconds. + Verify the circuit breaker is engaged. + Check that the AC (or DC) power cable (whichever relevant) is not damaged, that it is connected properly on both ends and that it has the required voltage supply. + Try to operate the unit.
System is not performing as expected i.e. No phones are being captured. LED lights are ON		<ul style="list-style-type: none"> + Check that external harnesses (RF, power, LAN) are plugged in all the way and are secure. + Check also the Omni scanner antennas are correctly connected.
If the issue persists there may be a possible malfunction that requires professional support		Contact your support team

Preventative maintenance

The following steps should be performed frequently to ensure the FalcoNet unit works without any problems and also performs efficiently.

- + Check all cables for signs of damage/ fatigue.
- + Check all connections are firmly secured in place.
- + Clean front panel.
- + Check there is no debris stuck in the fans and they are not making excessive noise.
- + Ensure that there is a minimum 10cm clearance from the back of the rack/ trolley and the nearest obstacle.

Technical specifications

Feature	Specifications
Overall System Specifications	
Number of BTS	9
Control Device	Laptop
System Specifications – Power	
Power Consumption (Typical/Peak)	800/1100 Watts
Operational Voltage	36 v DC
Power Supply	DPSU-S AC/DC
System Specifications – Mechanical / Environmental	
Removable Modules/Parts	<ol style="list-style-type: none"> 1. Brain Unit 2. CSI 3. GUL BTS
System Dimensions Brain Unit Dimensions	4U x 19" x 600mm H: 153mm x W: 386mm x D: 267mm
Overall System Weight Brain Unit Weight MPA-S Weight GUL Weight	37Kg 11Kg 26Kg 700g
Operating Temperature Range	0 ° to 45° Celsius
Storage Temperature Range	-40 ° to 85° Celsius
Vibration & Shock Standard Performed	ETSI EN 300 019-2-5 Class 5.1, 5M3
FCC ID	2A7A2-FNV1

RF Exposure Information

In the table below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

Band	Mode	FCC Limit (mW/cm ²)	Output AVG Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (mW)	Separ. Distance FCC (cm)
850 MHz	GSM	0.57	38.21	2.50	40.71	100.0	11776.06	40.56
1900 MHz	GSM	1.00	36.58	4.00	40.58	100.0	11428.78	30.17
850 MHz	WCDMA	0.57	34.20	2.50	36.70	100.0	4677.35	25.56
2100 MHz	WCDMA	1.00	38.90	3.00	41.90	100.0	15488.17	35.12
1900 MHz	WCDMA	1.00	35.89	4.00	39.89	100.0	9749.90	27.86
LTE 2	QPSK	1.00	27.40	4.00	31.40	100.0	1380.38	10.48
LTE 4	QPSK	1.00	30.17	3.00	33.17	100.0	2074.91	12.85
LTE 5	QPSK	0.57	30.66	2.50	33.16	100.0	2070.14	17.00
LTE 12	QPSK	0.47	32.82	2.50	35.32	100.0	3404.08	24.01
LTE 13	QPSK	0.47	32.81	2.50	35.31	100.0	3396.25	23.99
LTE 14	QPSK	0.47	28.00	2.50	30.50	100.0	1122.02	13.79
LTE 17	QPSK	0.47	31.78	2.50	34.28	100.0	2679.17	21.30
LTE 25	QPSK	1.00	27.44	4.00	31.44	100.0	1393.16	10.53
LTE 26	QPSK	0.57	32.67	2.50	35.17	100.0	3288.52	21.43
LTE 66	QPSK	1.00	24.79	3.00	27.79	100.0	601.17	6.92
LTE 71	QPSK	0.40	31.81	3.00	34.81	100.0	3026.91	24.55
LTE n71	QPSK	0.40	28.30	3.00	31.30	100.0	1348.96	16.39

Notes:

1. The manufacturer configures output power so that the maximum power after accounting for manufacturing tolerances, will never exceed the maximum power level measured
2. The output power in the table above is the maximum power per chain among various channels and various modes within the specific band
3. The antenna gain in the table above is the maximum antenna gain among various channels within the specified band

FCC Information

Supplier's Declaration of Conformity 47 CFR § 2.1077 Compliance Information

FCC ID: 2A7A2-FNV1

Unique identifier: FalcoNet

Responsible party – US contact information

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FCC Compliance statement subject to Part 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.