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Mega_Link 2
Product Familiarisation
Thames Water

Part 3 – 458 MHz UHF Radio

26th March 2026

Un-licenced Low Power Radio

- Ofcom publication IR 2030:
  - UK Interface Requirements 2030
  - Licence Exempt Short Range Device

IR2030/2	Industrial / Commercial Telemetry and Telecommand	Used for the control of remote equipment or transmission of datafrom that equipment.

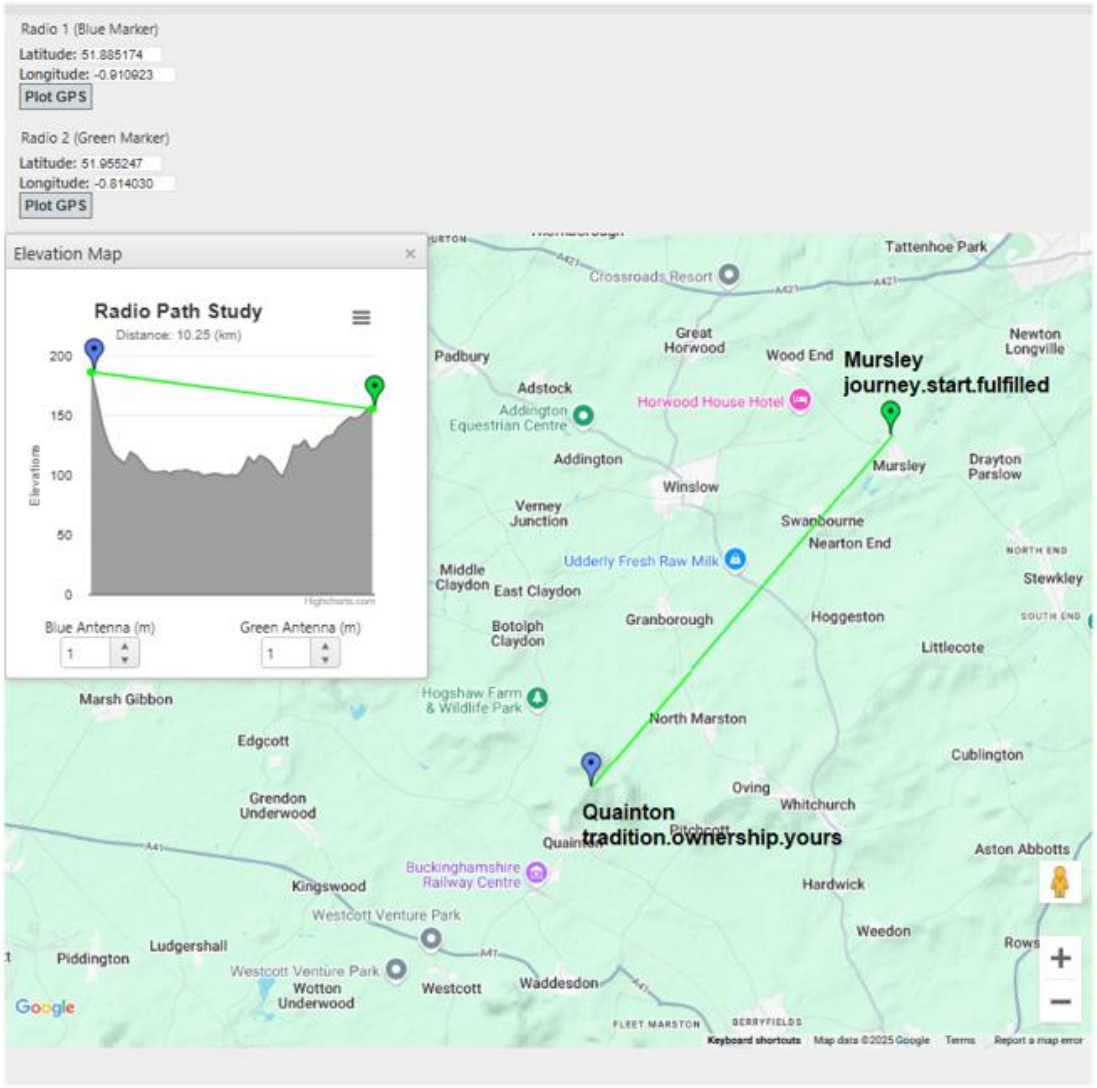
Industrial/ Commercial Telemetry and Tele-command

IR2030/2/6	Industrial/ Commercial Telemetry and Tele-command	Music and speech are only permitted when using a digitised signal. Airborne use is not permitted.	458.5 - 458.95 MHz	500 mW e.r.p.		Channel Spacing 12.5 kHz. Channel numbers 1 to 25 inclusive and 28 to 31 inclusive and 33 to 35 inclusive are available with a channel centre frequency of 458.5 MHz plus		EN 300 220
						(Channel Spacing times channel number).		

Typical Project Life-Cycle

1. Customer requirements and RFQ
2. Radio path desktop survey
3. Budgetary quotation
4. Radio path site survey
5. Update formal quotation
6. Requisition purchase order
7. Build, test & ship
8. Install
9. Commissioning

Radio Path Desktop Survey



Radio Path Survey - Results Sheet

Confidential? ~~YES~~ / NO		Surveyed by: Paul Blundell	
Customer : United Utilities		Tel: 07826 959 242	Mobile:
Address: Hurleston WTW, Chester Road, Hurleston, Nantwich, Cheshire. CW5 6BU		Project Name/Description: Delamere WTW etc	
Witness: Chris Gaskell	Witness Signature:	Date: 26/07; 19/09; 22/11/2018	Ref: Q9719 : WO 1888 Q9856 : WO 2037

Link 1: Delamere WTW – Sandiford WTW – Tested 26/07/2018

LOCATION: Cheshire	**Base-station: Sandiford WTW Coordinates: SJ 56713 66805**			**Outstation: Delamere WTW Coordinates: SJ 56108 67734**		
Test Channel: 18	Bearing to outstation: 327°			Distance from base-station: 1.11Km		
458.7250 MHz	**PROPOSED**	**SURVEY**		**PROPOSED**	**SURVEY**	
Power Supply	230/110VAC	-		230/110VAC	-	
Equipment Type	Mega_Link	Mega_Link		Mega_Link	Mega_Link	
Aerial Type	UHF 4	ENF		FUC 3	ENF	
Feeder length	20	10	m	15	10	m
Aerial height above ground	7	5	m	11	8	m
Aerial pole length	4	5	m	4+2 (c/w Joint Bkt)	4.5	m
Aerial brackets	6" Channel Bkts	N/A		12" Standoff	N/A	
U bolts required	N/A	N/A		N/A	N/A	
TX Power	500	500	mW	500	500	mW
TX Power *(see table overleaf)*	134	134	dBµV	134	134	dBµV
+ Aerial Gain *(see table overleaf)*	7.5	0	dB	3	0	dB
- Feeder loss *(see table overleaf)*	4	2	dB	3	2	dB
ERP (134dBµV max)	134.0	132.0	dBµV	134.0	132.0	dBµV
Read from Test Set:	Local RSSI	12.0	dBµV	Remote RSSI	12.0	dBµV
Copied from corresponding box above:	- Survey outstation ERP	132.0	dBµV	- Survey base station ERP	132.0	dBµV
	+ Proposed outstation ERP	134.0	dBµV	+ Proposed base station ERP	134.0	dBµV
	- Survey b/s aerial gain	0	dB	- Survey o/s aerial gain	0	dB
	+ Proposed b/s aerial gain	7.5	dB	+ Proposed o/s aerial gain	3.0	dB
	+ Survey b/s feeder loss	2.0	dB	+ Survey o/s feeder loss	2.0	dB
	- Proposed b/s feeder loss	4.0	dB	- Proposed o/s feeder loss	3.0	dB
Adjust for radio receiver sensitivity:	+ Proposed RX Sensitivity	10	dBµV	+ Proposed RX Sensitivity	10	dBµV
Proposed Receive Margin	**Base-station:**	**29.5**	**dB**	**Outstation:**	**26.0**	**dB**

Channel Frequencies

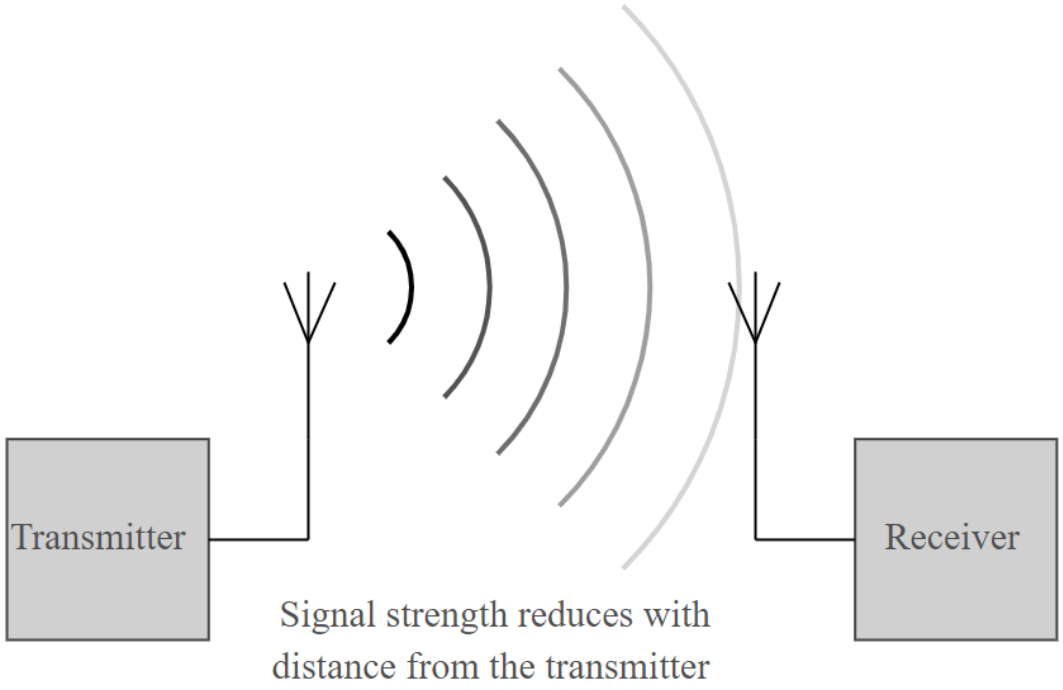
Mega_Link Channels - 458.xxxxMHz (avoid those in red)

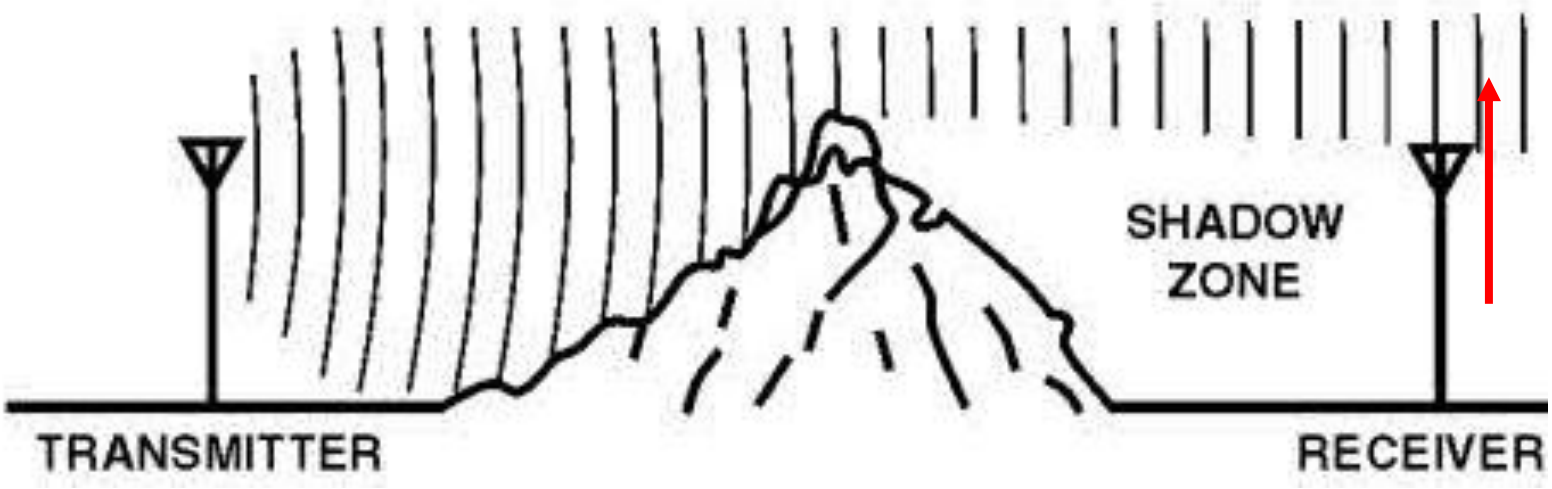
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	5125	5250	5375	5500	5625	5750	5875	6000	6125	6250	6375	6500	6625	6750	6875
16	17	18	19	21	22	23	24	25	26	27	28	29	30	31	32
7000	7125	7250	7375	7625	7750	7875	8000	8125	8500	8625	8750	8875	9000	9125	9250

See Application note:
AN026 Channel Frequencies.pdf

Radio Path Considerations

- Topology:
  - At UHF frequencies, radio signals travel in straight lines, so transmitter-receiver should ideally have a line of sight
  - Hills, buildings, dense vegetation can block signal
- Transmitter Output Power:
  - Fixed 500mW by regulations
- Propagation Loss:
  - In theory signal falls off inversely proportional to square of distance, in practice the fall off is always worse than this Urban clutter etc.
- Receiver Sensitivity:
  - Mega_Link 2 uses modern high sensitivity receiver technology
- Aerial Efficiency (& Aerial Gain)
- Aerial Location
- Feeder Loss because of cable length





Works best with line of sight.
Aerial height is your friend!

Aerials

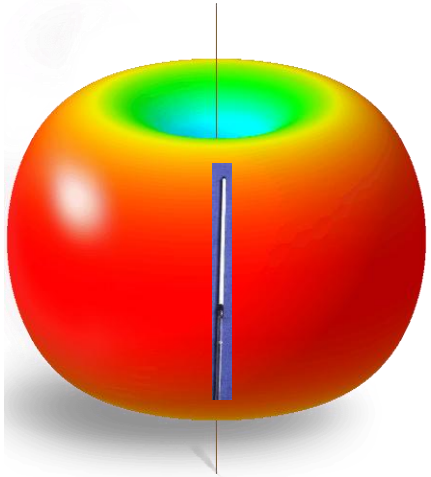
End fed dipole (0dB)
ENF450

Co-linear (6dB)
FUC6

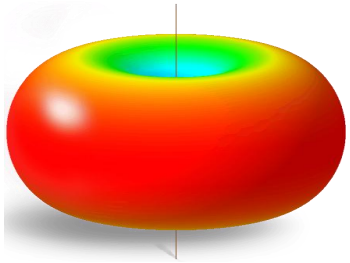
8 element Yagi (10dB)
UHF8

ENF450 End Fed Dipole 0dB gain 0.5m

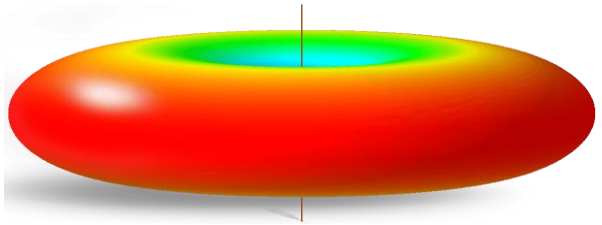
Our go to aerial – good all rounder!



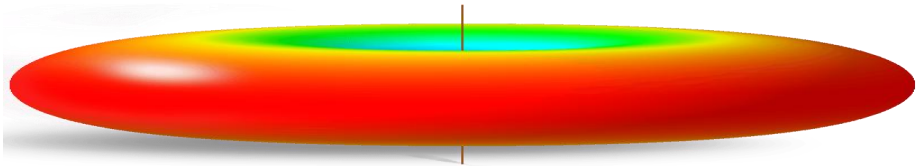
FUC3 Colinear 3dB gain, 1.16m



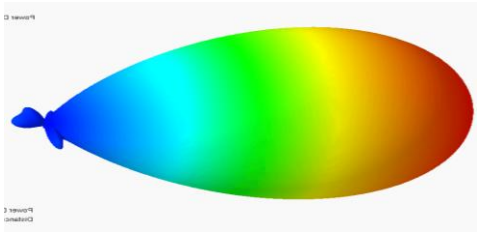
FUC6 Colinear 6dB gain, 3.05m

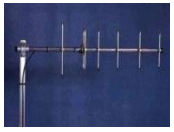


FUC10 Colinear 10dB gain, 5.2m

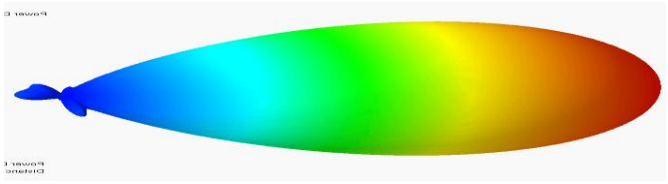


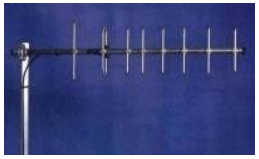
UHF4 4 Element Yagi
7.5dB gain



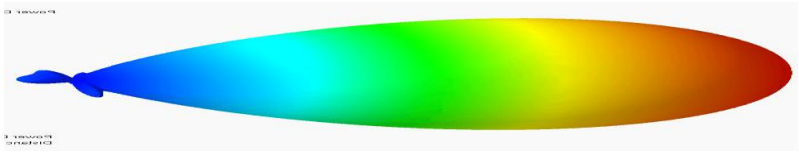


UHF6 6 Element Yagi
8.5dB gain

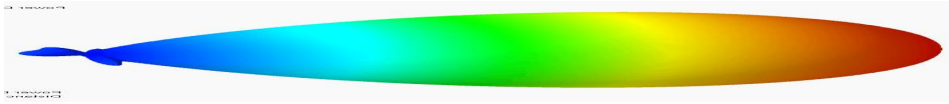


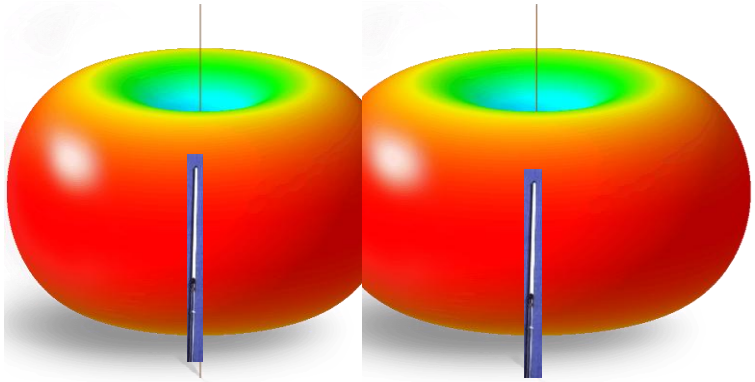


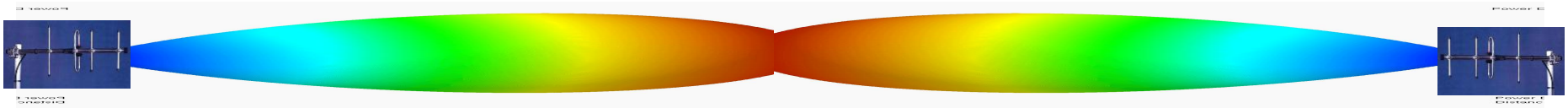
UHF8 8 Element Yagi
10dB gain



UHF12 12 Element Yagi
12dB gain







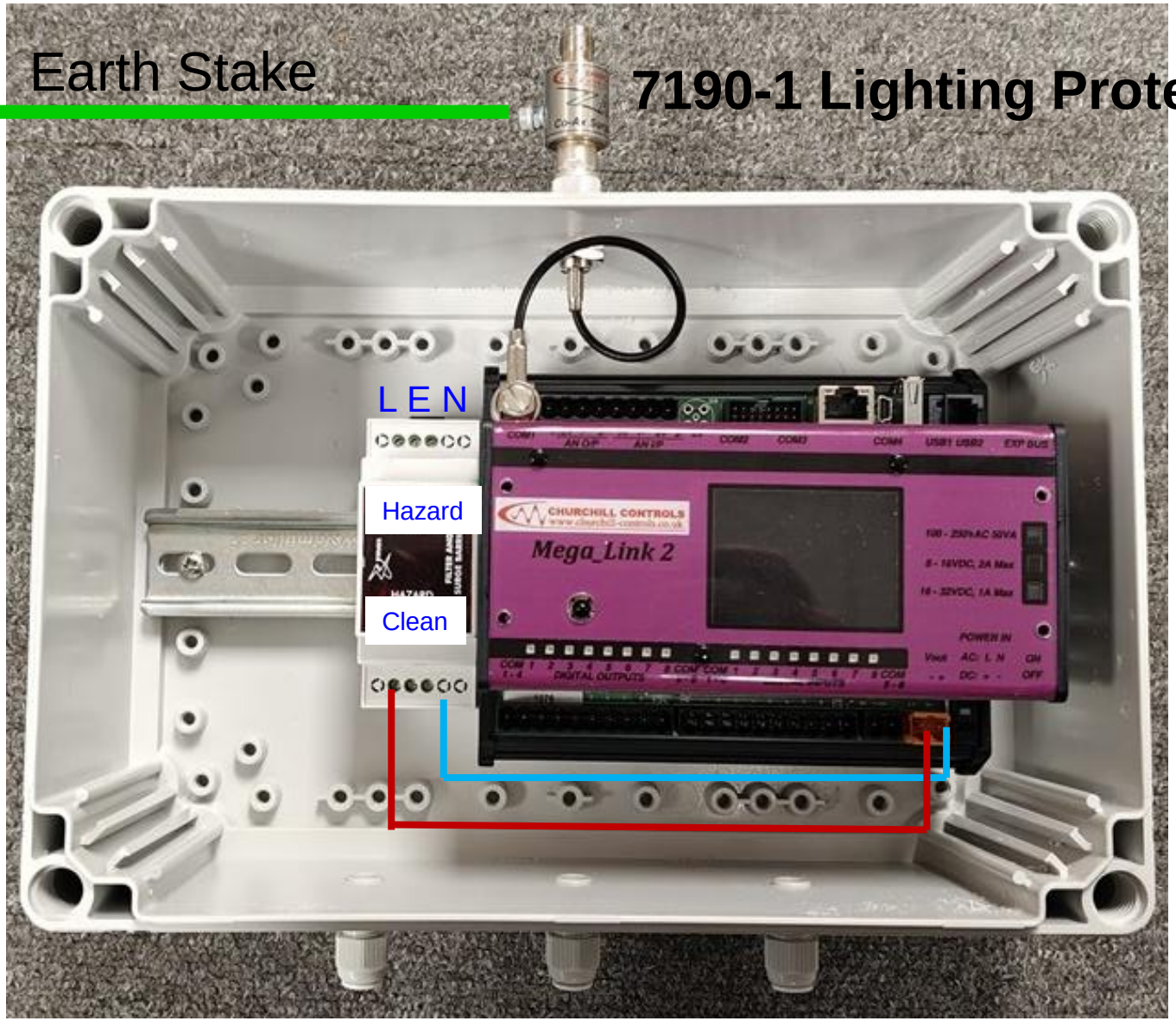
Yagis with gain give longer range but are directional and will require alignment for best signal strength

Lightning Protection Unit

Earth Bonding Terminal

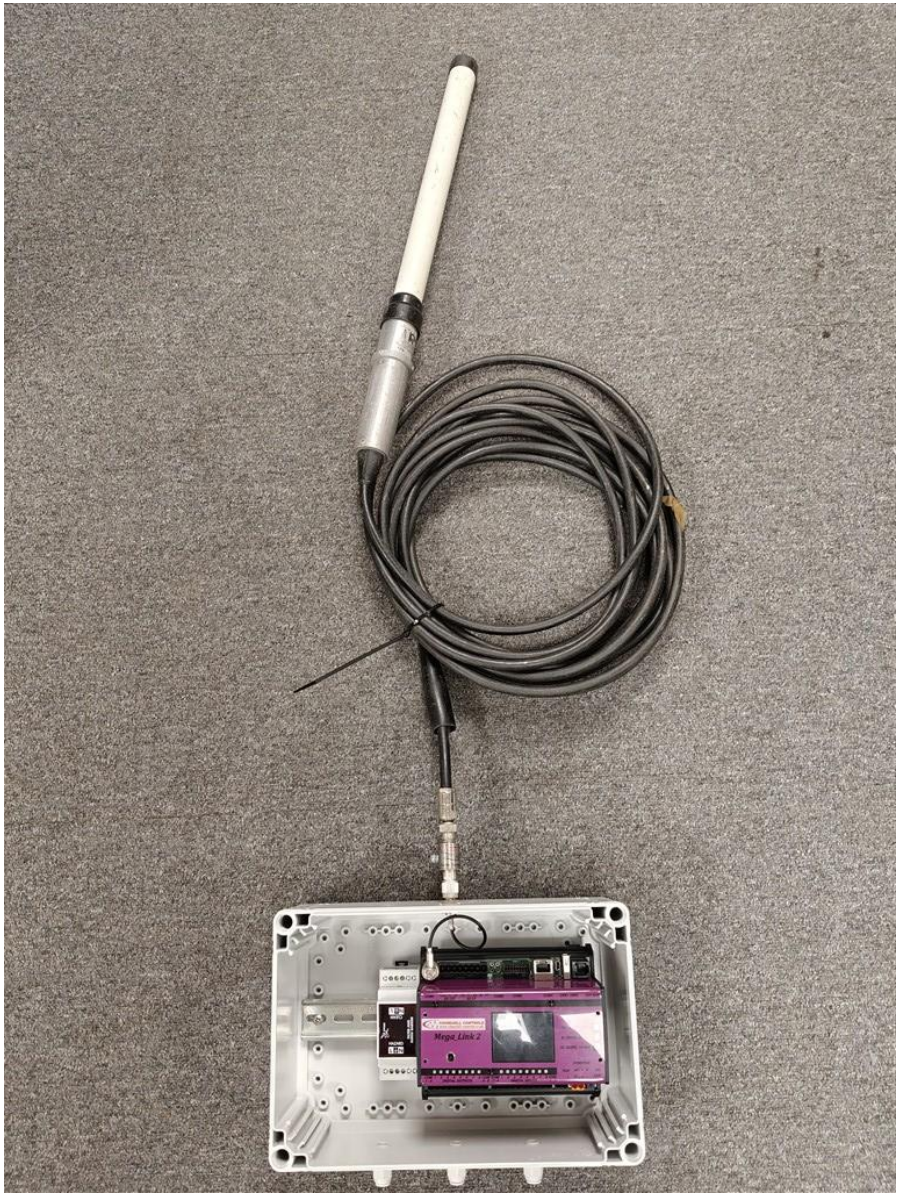
7190-1 ZapGap

7190-1 Lighting Protector

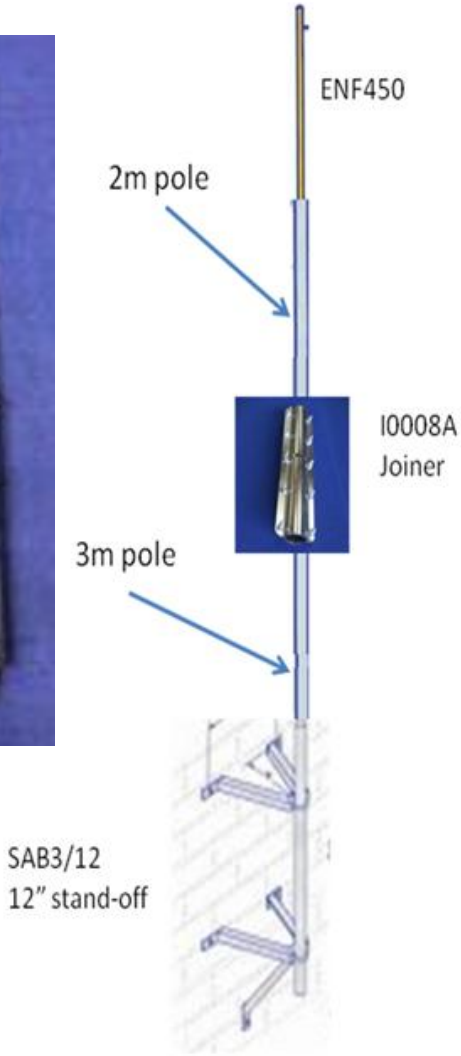


End-Fed Dipole

ENF450/10
(our most popular)

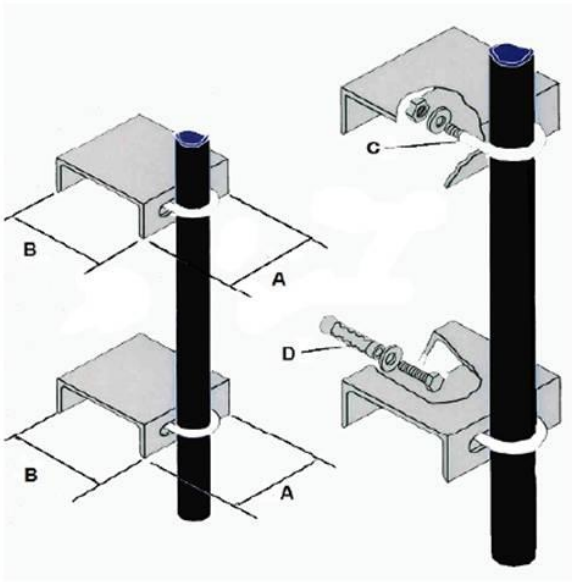


Aerial Mounting Hardware



CS6D2W
For mounting ENF450 without poles

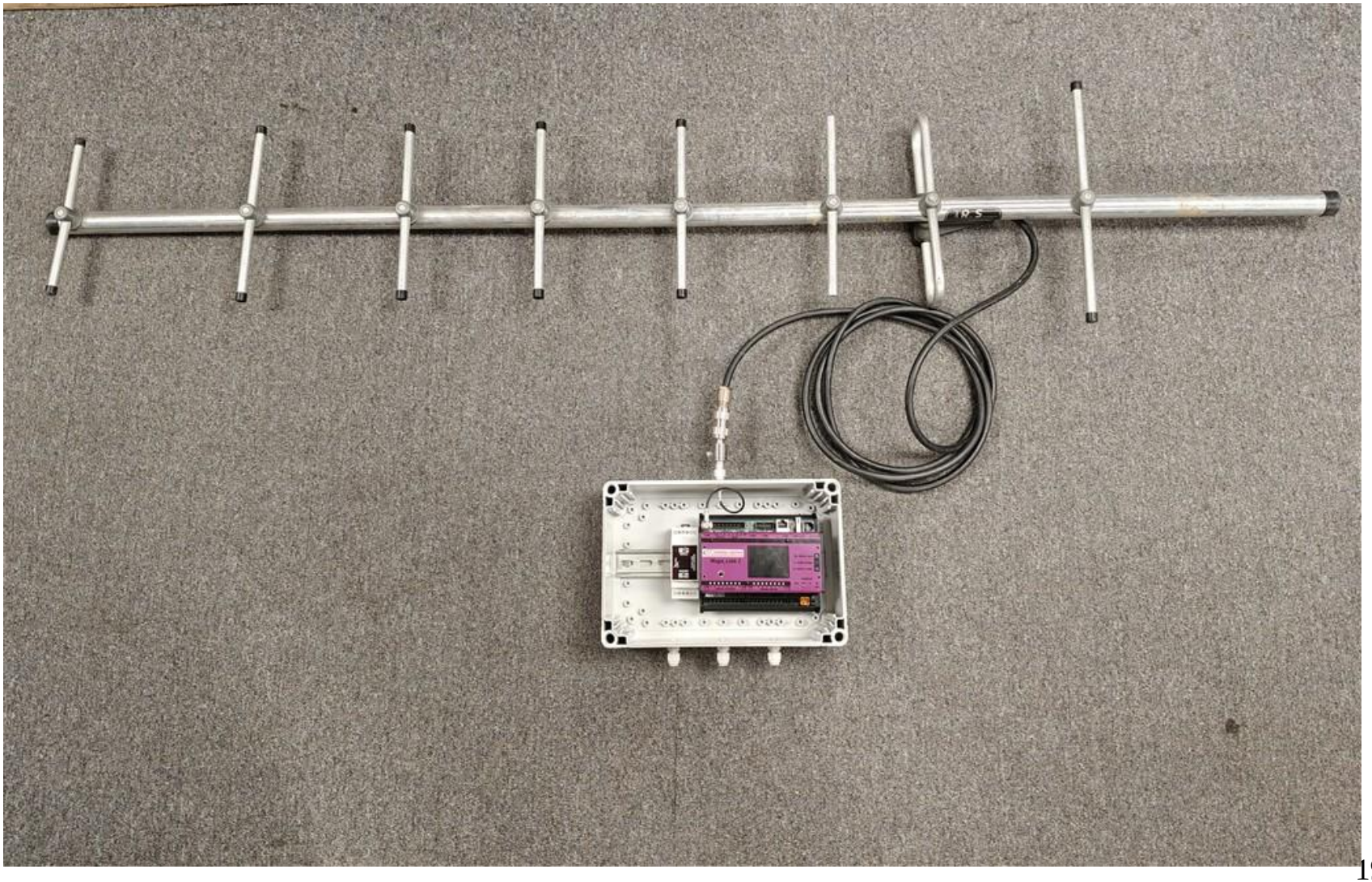
Wall mounting channel brackets



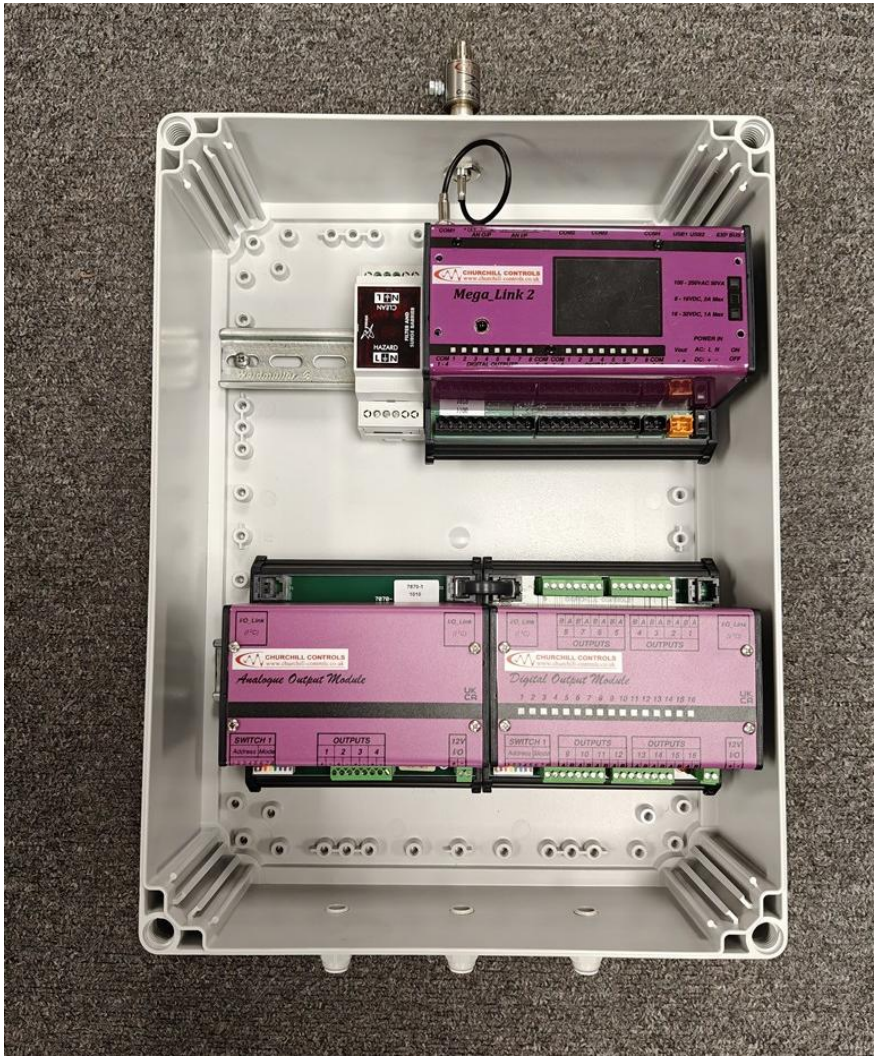
CS6
6" stand-off

Stock code	A	B	C	D
CS4	130mm	92mm	GUB002	RAWLBOLT/10
CS5	130mm	127mm	GUB002	RAWLBOLT/10
CS6	130mm	152mm	GUB002	RAWLBOLT/10

8-Element Yagi

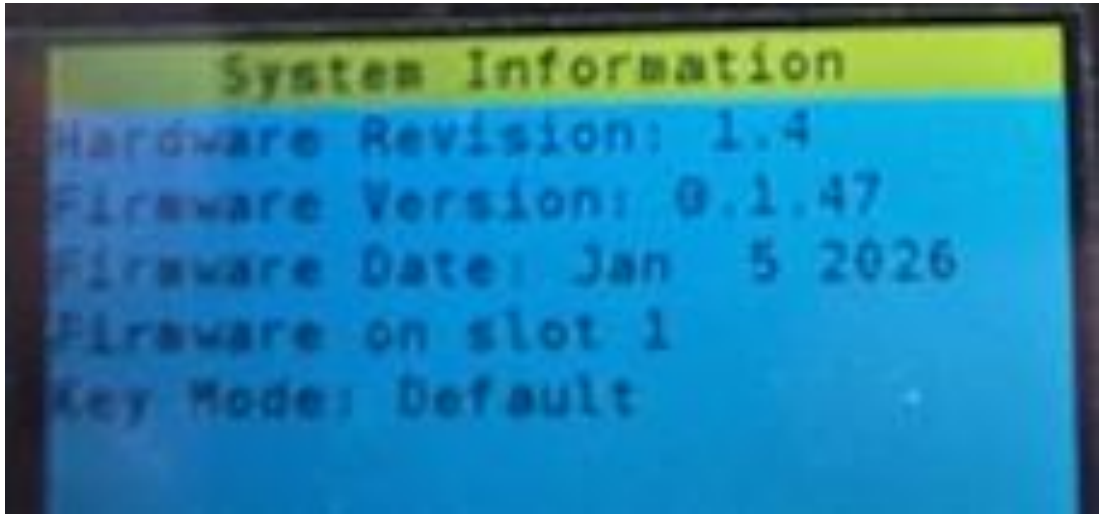


I/O Expansion



Firmware Version

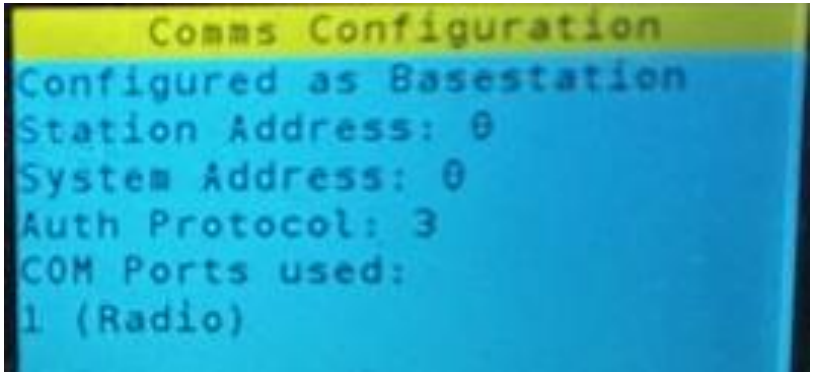
System Configuration -> System Information

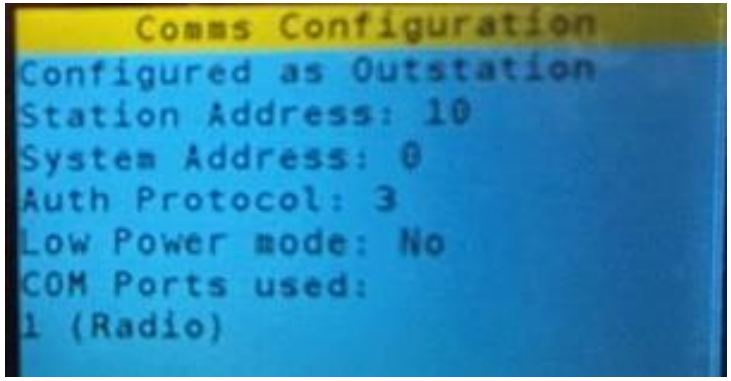


Firmware Version: 0.1.47

Comms Configuration

System Configuration -> Comms Configuration



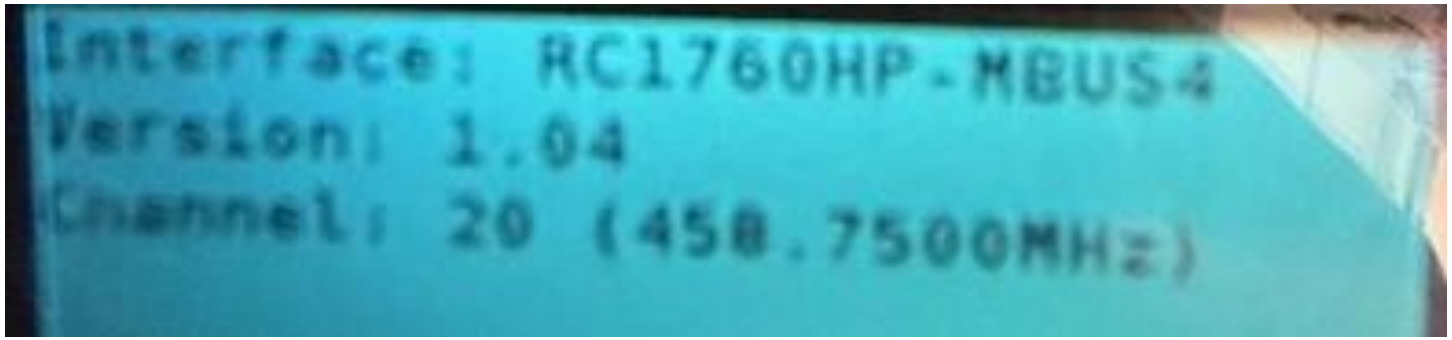


Basestation
Address 0
Radio in COM1

Outstation
Address 10
Radio in COM1

Channel Setting

System Configuration -> COM1 Port Details



Radio Crafts RC1760HP

Channel: 20 (458.7500MHz)

Eavesdrop Comms

Comms Traffic -> COM1 Traffic

Basestation

Outstation 10

Basestation Tx is Green → Outstation Rx is Red

↓

Basestation Rx is Red ← Outstation Tx is Green

RSSI Readings

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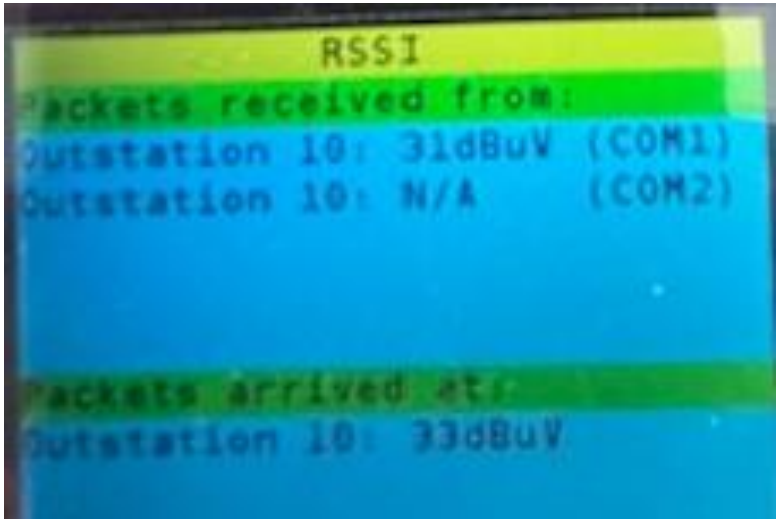
System Status -> RSSI

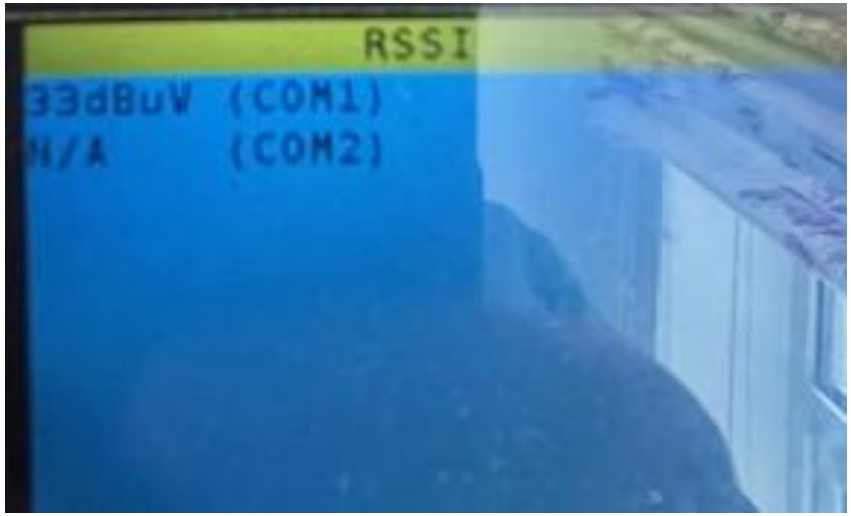
Basestation



Signal received from Outstation 10 is 31dBµV

Signal which arrived at Outstation 10 was 33dBµV

Outstation 10



Signal received from Basestation is 33dBµV

LED Indicators

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Basestation

Outstation 10

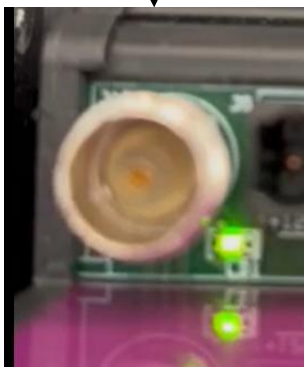
(1)

BS Tx is Green

(2)

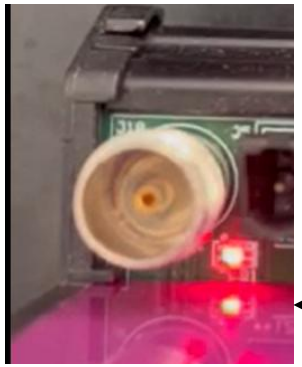
OS 10 Rx is Red

(3)



OS 10 Tx is Green

(4)

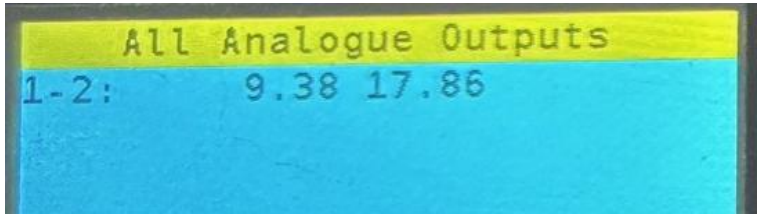


BS Rx is Red

Analogue I/O

System Status -> All Analogue Outputs

Basestation



System Status -> All Analogue Inputs

Outstation 10