



# RET WORKSHOP

Trainer: Vuth Ith

June - 2019

connecting the mobile world

# TRAINING OBJECTIVES

- ❑ Gain knowledge on basic RET Systems
- ❑ Become familiar with Legacy & NWA V RET antennas
- ❑ Understand the testing and troubleshooting of RETs
- ❑ Learn the operation of the JMA RET Controller and GUI

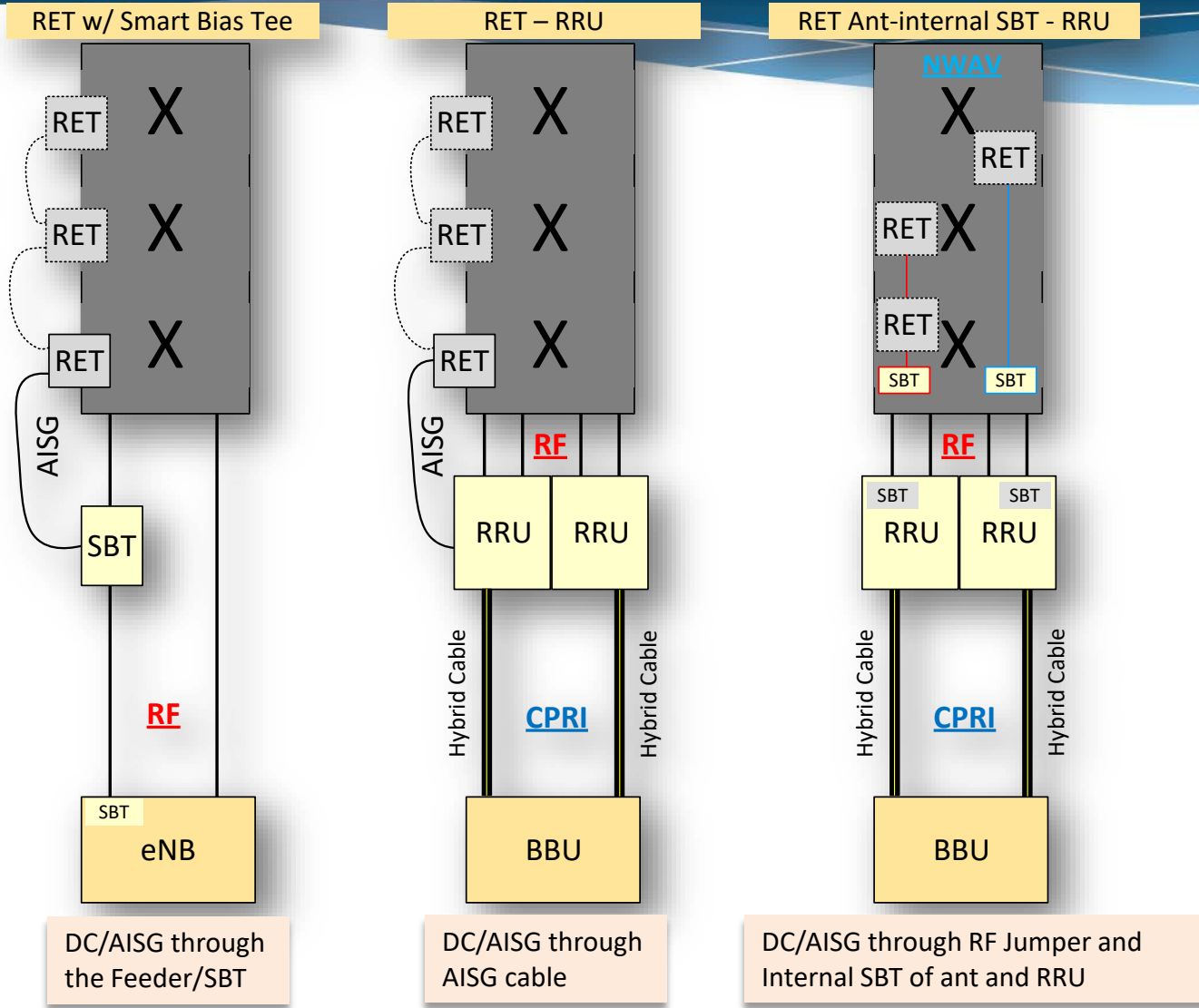


# TRAINING - AGENDA

- ❑ RET SYSTEM DIAGRAMS
- ❑ ANT LABEL & RET DIAGRAMS
- ❑ LEGACY RETS & GUI OPERATION
- ❑ PRE-TESTING & COMMISSIONING
- ❑ TROUBLESHOOTING
- ❑ NWAV RETS & GUI OPERATION
- ❑ JMA WEBSITE & SUPPORT



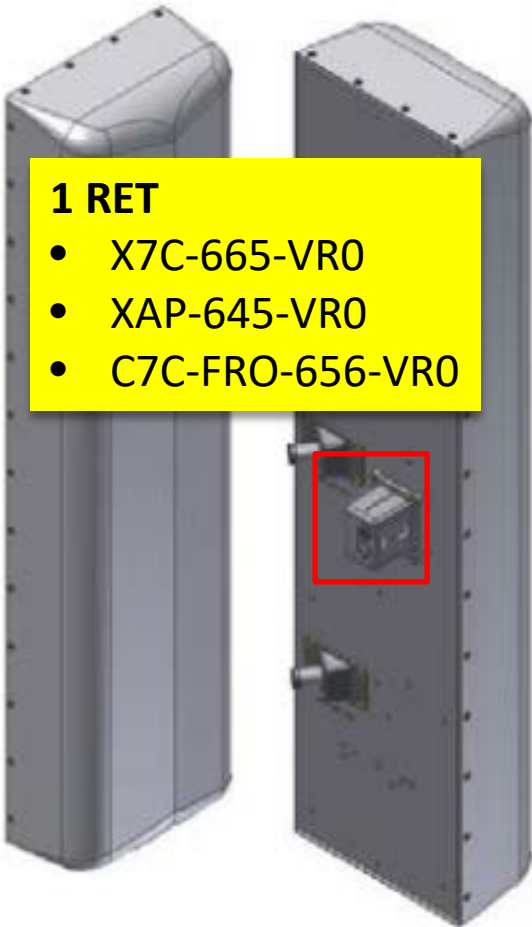
# RET SYSTEM DIAGRAMS



# JMA RET ANTENNAS

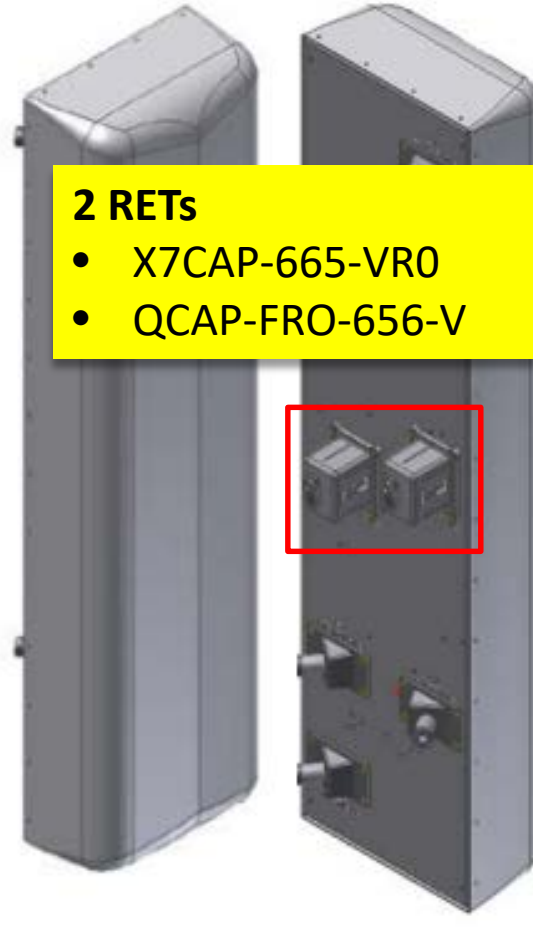
## 1 RET

- X7C-665-VR0
- XAP-645-VR0
- C7C-FRO-656-VR0



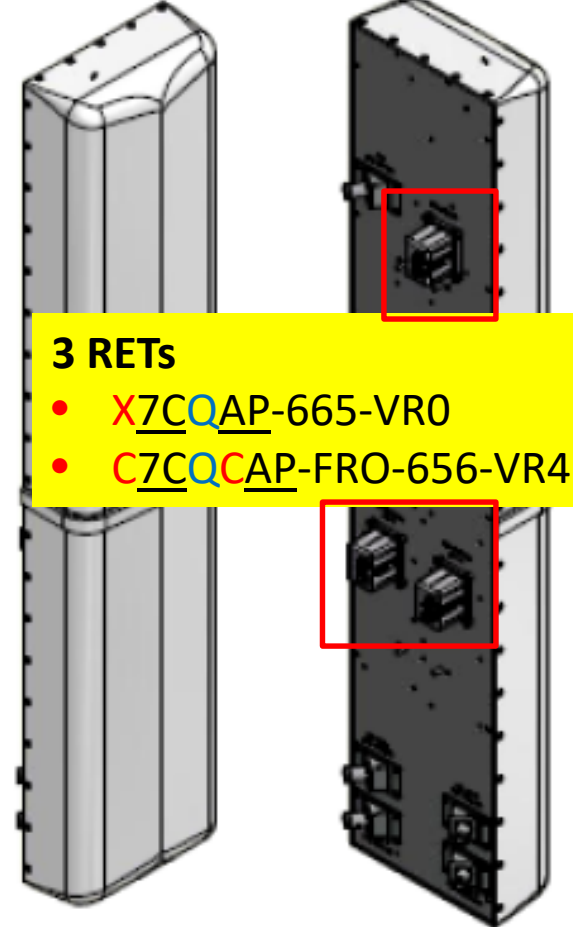
## 2 RETs

- X7CAP-665-VR0
- QCAP-FRO-656-V



## 3 RETs

- X7CQAP-665-VR0
- C7CQCAP-FRO-656-VR4



# JMA ANTENNA & RET LABELS – GEN1



Ant Serial#

Ant Model#

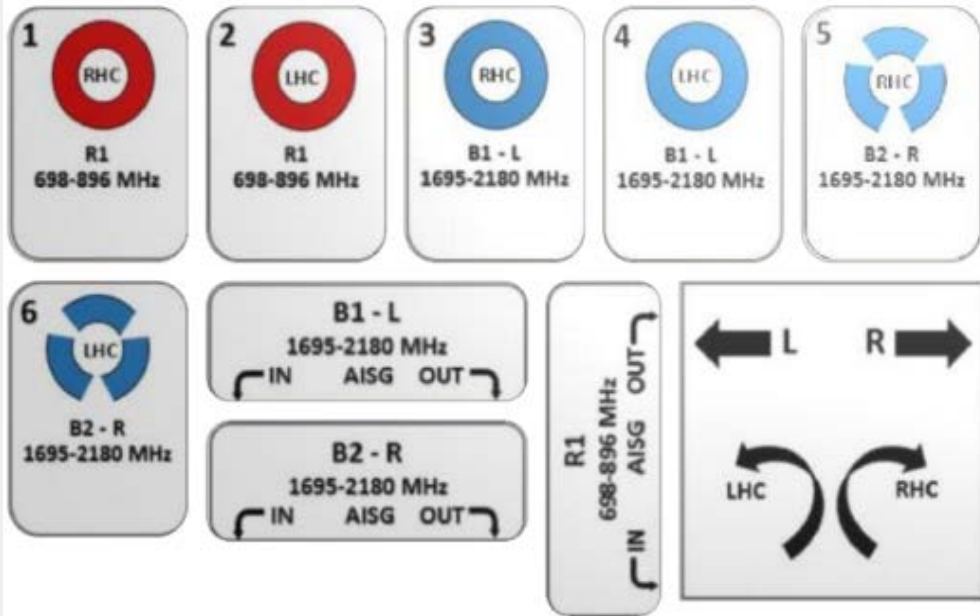
Ant Info



# JMA ANTENNA PORT & RET LABELS – GEN1

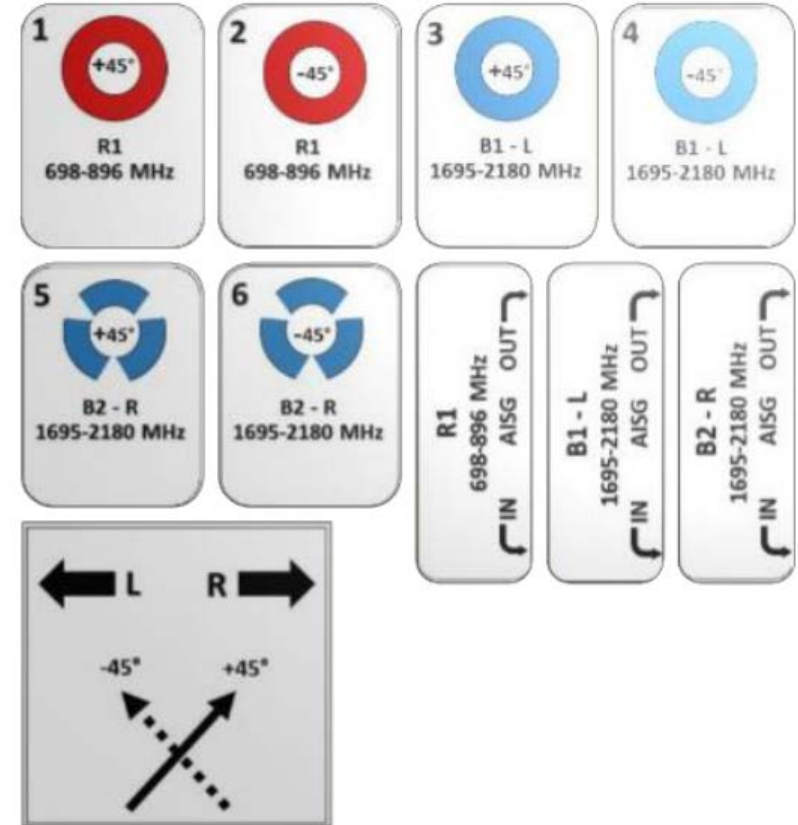
## CP Antennas

### PORT RET LABELING

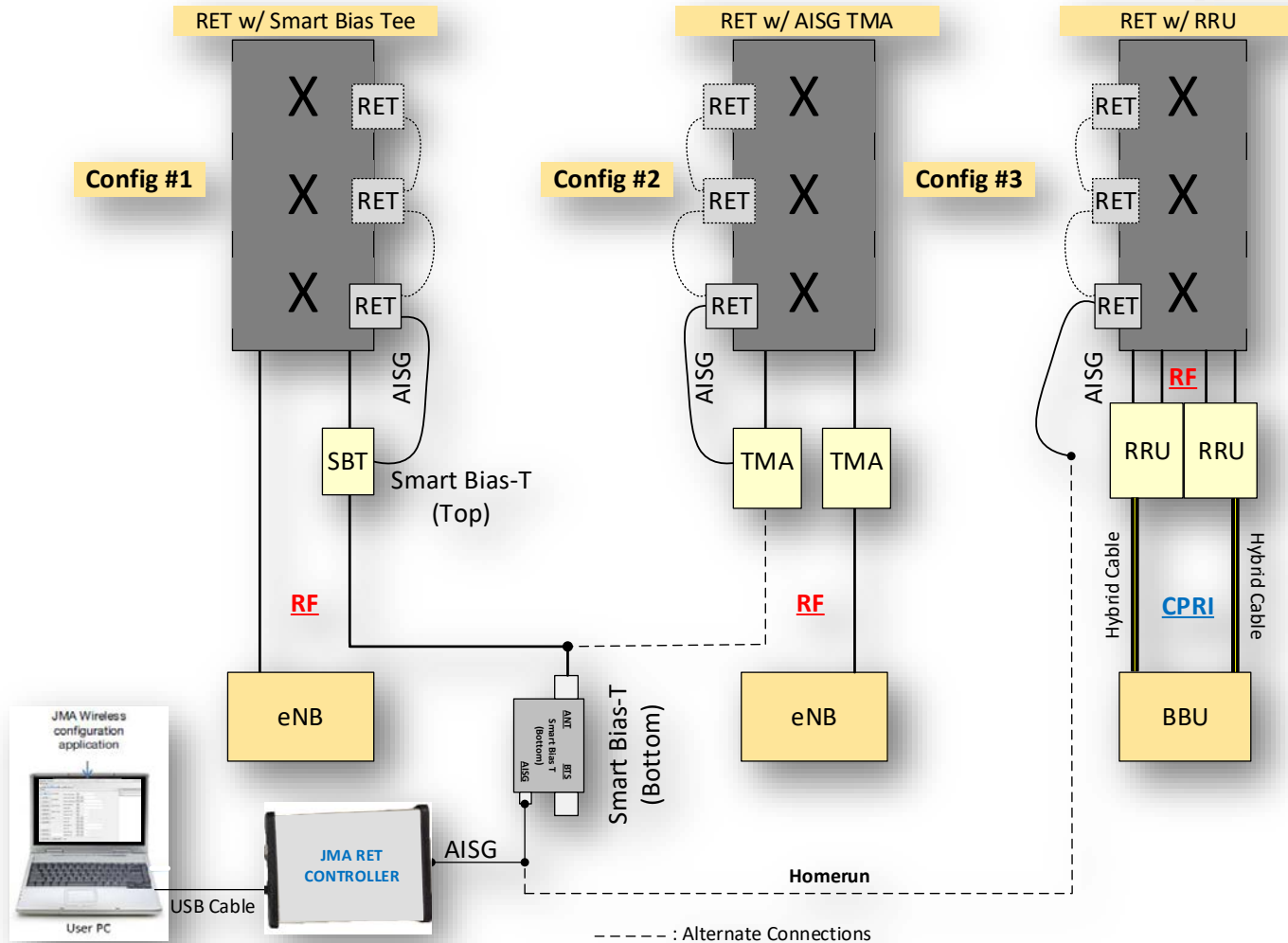


## X-Pol Antennas

### PORT / RET LABELING



# RET – 200 TEST DIAGRAM





# GUI OPERATION – COM SET UP

Device Manager

File Action View Help

1

LPX-LT-VITH

- Audio inputs and outputs
- Batteries
- Bluetooth
- Computer
- Disk drives
- Display adapters
- Firmware
- Human Interface Devices
- IDE ATA/ATAPI controllers
- Imaging devices
- Keyboards
- Memory technology devices
- Mice and other pointing devices
- Monitors
- Network adapters
- Other devices
- Portable Devices
- Ports (COM & LPT)**
  - Standard Serial over Bluetooth link (COM4)
  - Standard Serial over Bluetooth link (COM5)
  - Standard Serial over Bluetooth link (COM7)
  - Standard Serial over Bluetooth link (COM8)
  - USB Serial Port (COM3)** ← PCU-1000
  - LINUX SDM-USB-QS-S (COM4)** ← ATC Lite-200

View Alarm Controls To

Output

ALD List

**Options...**

Application Look

2

Application Options

Serial Port: **COM3** Detect Port

Baudrate: 9600 Restore Default

3

MsgController

Opened and Configured serial port successfully

OK

OK Cancel Apply

Output

Open Save Run Clear

| Lev | Timestamp    | Class | ALD | Message  |
|-----|--------------|-------|-----|--|
| i   | 19:42:18:561 | COMM  | ... | Searching for COM ports...                             |
| i   | 19:42:18:914 | COMM  | ... | COM3 - FTDI - FTDIBUS\VID_0403&PID_6014+FT2I8C0GA\0000 |
| i   | 19:42:18:916 | COMM  | ... | Found 2 ports  |
| i   | 19:42:22:880 | HDLC  | ... | Configuring port 'COM3'                                |
| i   | 19:42:22:880 | COMM  | ... | Opening com port 'COM3'                                |
| i   | 19:42:22:898 | MAIN  | ... | Successfully opened and configured com port            |

4



# GUI OPERATION – RET-200

The screenshot displays the AisgController - ALD #1 GUI. The interface is divided into several sections:

- Device List:** A table on the left showing a list of devices with columns for ALD, Unique Id, and Tilt.
- RET Info:** A panel containing fields for Product Number (CSS RET-200), RET Unique Id (CC0000000000189001), Software Version (SW\_RET\_160311\_1), Hardware Version (561105 Rev B), and Current Alarm (None).
- RET Control:** A panel with buttons for GET TILT, SET TILT (0.0), CALIBRATE, CALIBRATE ALL, CONFIG DWN, and FIRMWARE DWN.
- Ant Info:** A panel for antenna configuration with fields for Model Number (XAP-660-VRO), Serial Number (12345), Frequency Band (1, 2, 3, 4, ...), Beamwidth (60, 0, 0, 0), Gain (18.2, 0.0, 0.0, 0.0), Max Tilt (6.0), and Min Tilt (0.0).
- Operator Fields:** A panel for operator settings with fields for Install Date (022618), Install Id (12345), Antenna Bearing (225.0), Mechanical Tilt (20.0), Base Station Id (JMA Tower1-Keller), and Sector Id (Alpha\_Pos1).
- Logs:** An output window at the bottom showing a log of messages with columns for Lev, Timestamp, Class, ALD, and Message.

| ALD | Unique Id           | Tilt |
|-----|---------------------|------|
| 1   | CC00000000000189001 | 0.0  |
| 2   | CC0000000000060534  | 4.0  |

| Lev | Timestamp    | Class | ALD | Message                  |
|-----|--------------|-------|-----|--------------------------|
| i   | 17:00:44:357 | COMM  | ... | TX[06] 7E 01 F1 99 F0 7E |
| i   | 17:00:44:439 | COMM  | ... | RX[06] 7E 01 F1 99 F0 7E |
| i   | 17:00:44:459 | POLL  | 002 | Polling Request          |
| i   | 17:00:44:459 | COMM  | ... | TX[06] 7E 02 B1 F5 98 7E |
| i   | 17:00:44:534 | COMM  | ... | RX[06] 7E 02 B1 F5 98 7E |



# ANTENNA FILE SELECTION – RET-200

2. ACF selection is based on antenna model, frequency band, and RET firmware rev. See Figure 20 for an example.

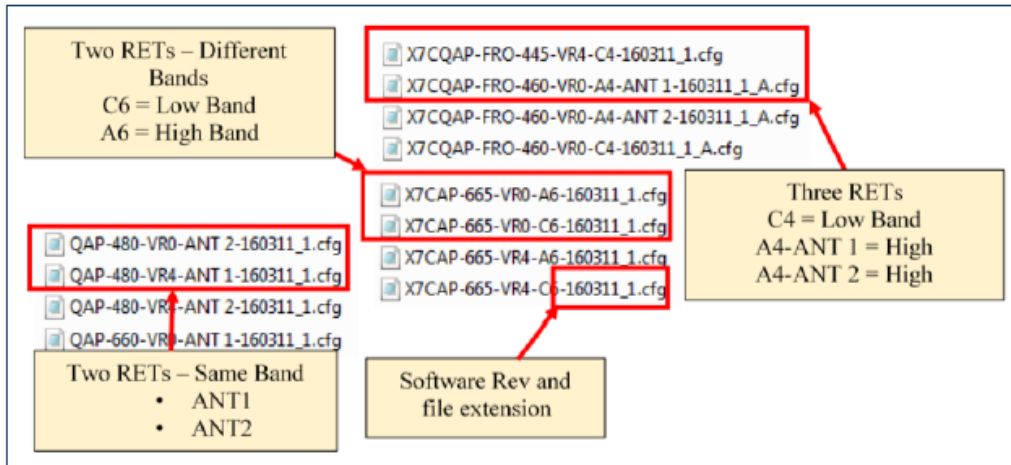
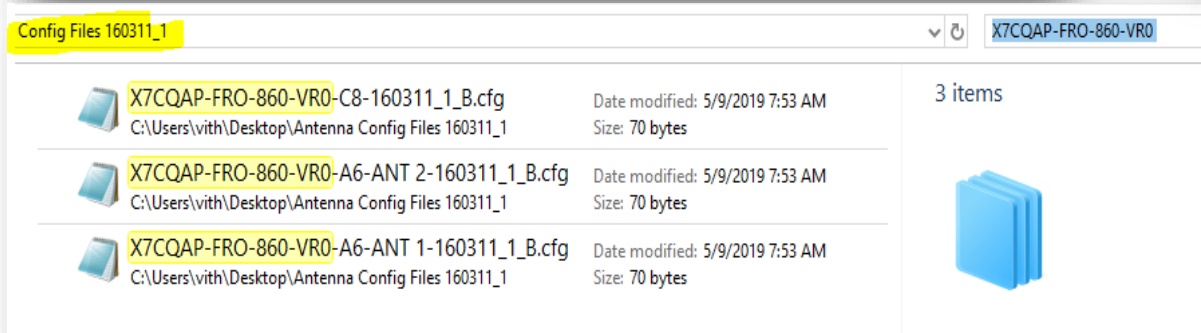
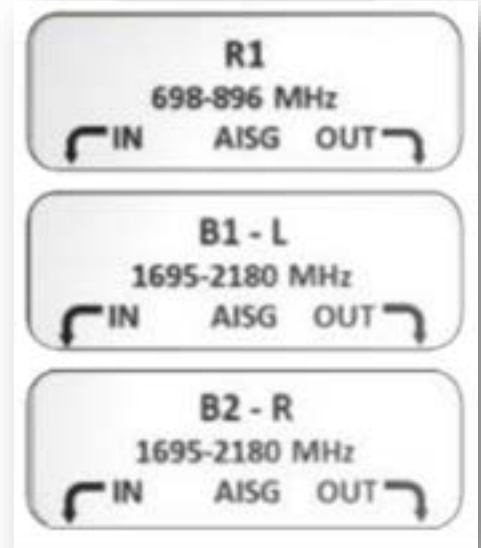


Fig. 20 – ACF selection guide

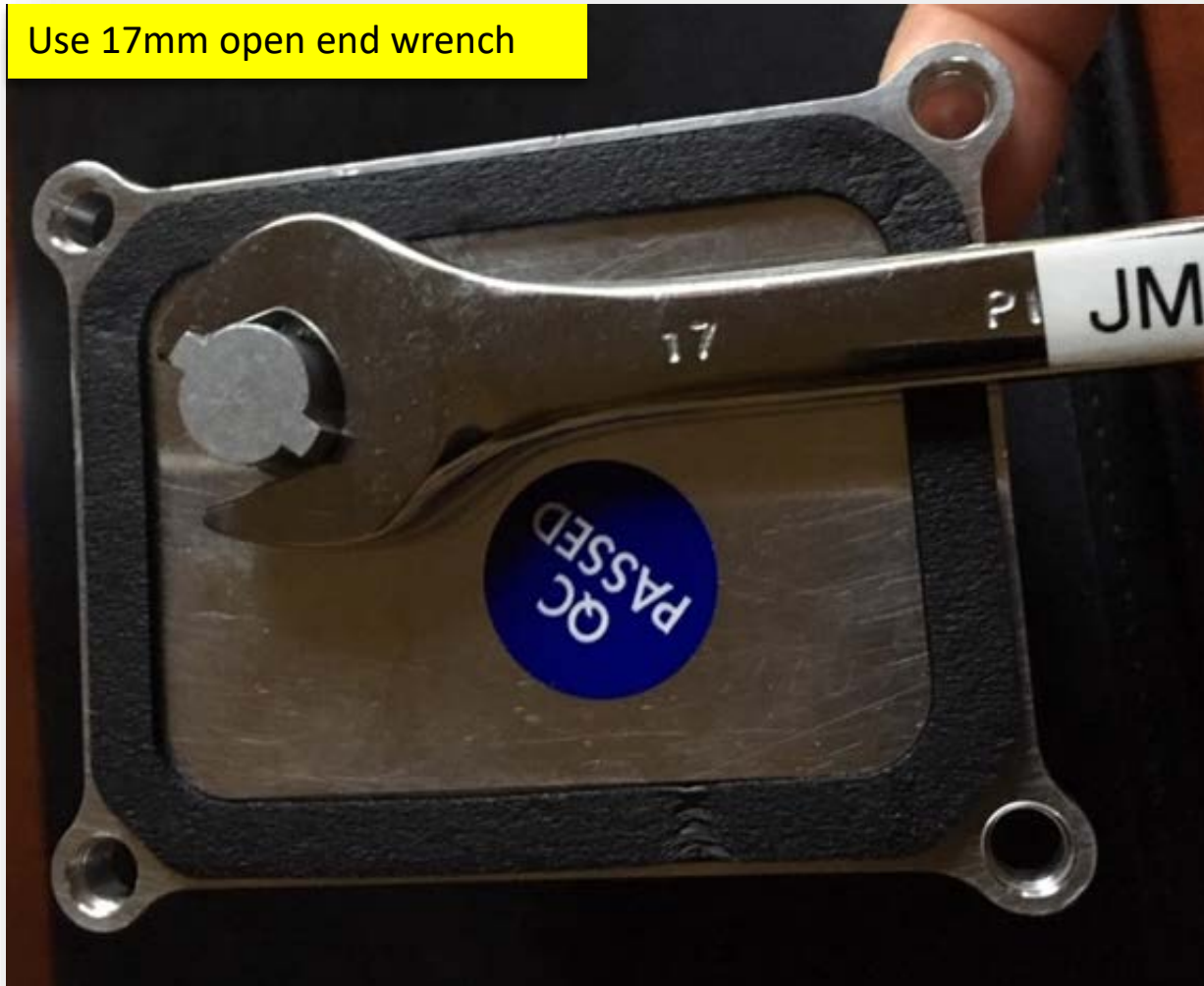
- Antenna models with one RET will only have one file.
- If antenna models have two or three RETs:
  - For different bands, one for low and one for high band:
    - A is High Band file (Remember A for AWS)
    - C is Low Band file (Remember C for Cell)
  - For two of the same bands:
    - -1 is for Ant 1
    - -2 is for Ant 2

## RET Labels

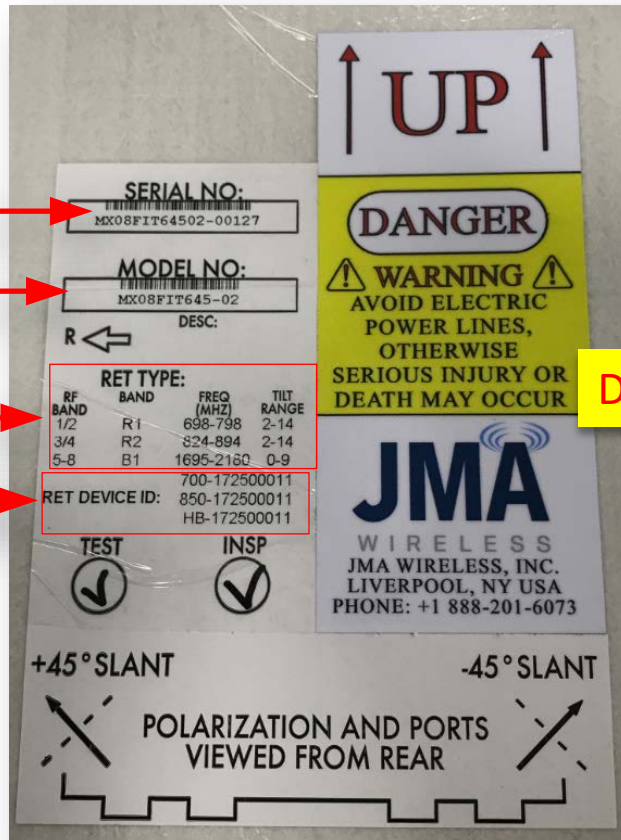


# RET-200 – CAL TEST

Use 17mm open end wrench



# NWAV ANTENNA LABEL



Ant Serial#

Ant Model#

Ant/RET Info

RET UIDs



# NWAV ANTENNA NOMENCLATURE

All NWAV™ antennas contain 13 characters:

**MX08FRO660-02**

(actual model label)

**MX08FRO660-02**

|     |                      |
|-----|----------------------|
| M   | Product series       |
| X   | Polarization         |
| 08  | No. of antenna ports |
| FRO | Product feature      |
| 6   | Package              |
| 60  | Horizontal beamwidth |
| 02  | Variant              |

## NWAV antenna nomenclature: label categories

### Product Series

M = macro

C = cylinder

S = stadium

D = DAS

### Polarization

V = vertical

X = X-Pol

C = circular

### No. of antenna ports

2, 4, 6, 8, 10, 12

### Product feature

FRO = Fast Roll Off

FIT = Form Is Tighter

OMI = Omni

TRI = Trisector

### Package

1, 2, 4, 6, 8

### Horizontal beamwidth

xx – represents horizontal beamwidth in degrees

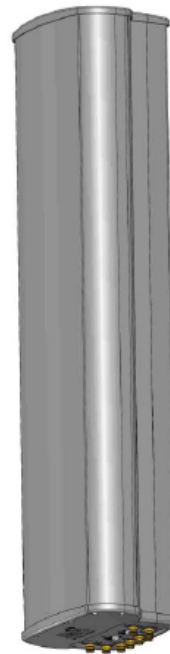
### Variant

01 = RET with external AISG ports only

02 = RET with Smart Bias Tee and external AISG ports

03 = Extended low-band frequency range 698-960 with RET

04 = Extended low-band frequency range 698-960 with MET



**nwav**  
technology

## Tilt Summary

- **Four Foot**
- 698-798 MHz 2-16 Degrees
- 824-894 MHz 2-16 Degrees
- 1695-2180 MHz 0-9 Degrees

- **Six Foot**
- 698-798 MHz 2-14 Degrees
- 824-894 MHz 2-14 Degrees
- 1695-2180 MHz 0-9 Degrees

- **Eight Foot**
- 698-798 MHz 2-12 Degrees
- 824-894 MHz 2-12 Degrees
- 1695-2180 MHz 0-9 Degrees

- **Note:**
- 698-798 MHz Independent Tilt
- 824-894 MHz Independent Tilt
- 1695-2180 MHz Independent Tilt

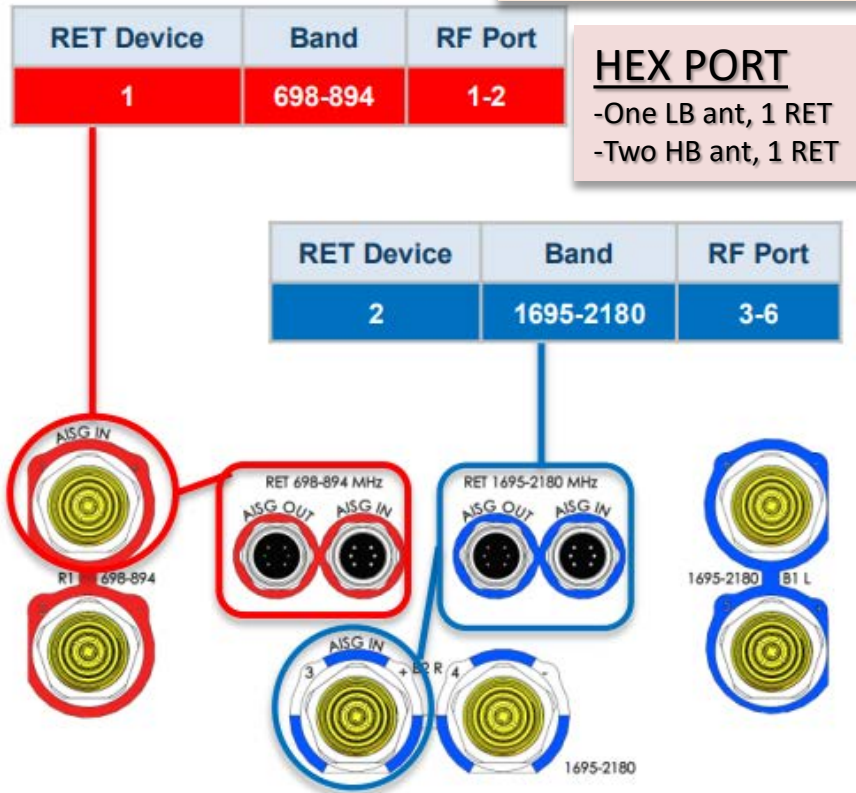


# NWAV - RET & PORT TOPOLOGY

## RET & RF Connector Topology

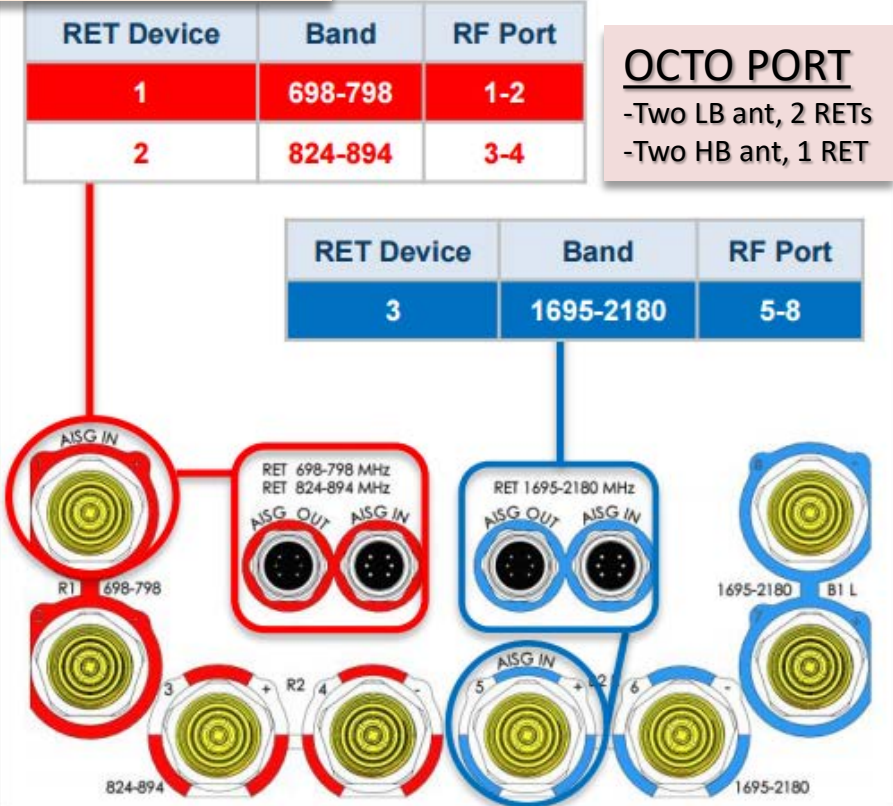
Each RET device can be controlled either via the designated external AISG connector or RF port as shown below

- Two SETS of DC/AISG Bus: LB (RED) & HB (BLUE)
- ONLY one DC/AISG connection per path is allowed



## RET & RF Connector Topology

Each RET device can be controlled either via the designated external AISG connector or RF port as shown below



# NWAV – ARRAY TOPOLOGY

## Array Topology

3 sets of radiating arrays

R1: 698–894MHz  
 B1: 1695–2180MHz  
 B2: 1695–2180MHz

### HEX PORT

-One LB ant  
 -Two HB ant

| Band      | RF Port |
|-----------|---------|
| 1695–2180 | 3–4     |
| 698–894   | 1–2     |
| 1695–2180 | 5–6     |



## Array topology

3 sets of radiating arrays

R1/R2 – 698-894MHz  
 B1 – 1695-2180MHz  
 B2 – 1695-2180MHz

### OCTO PORT

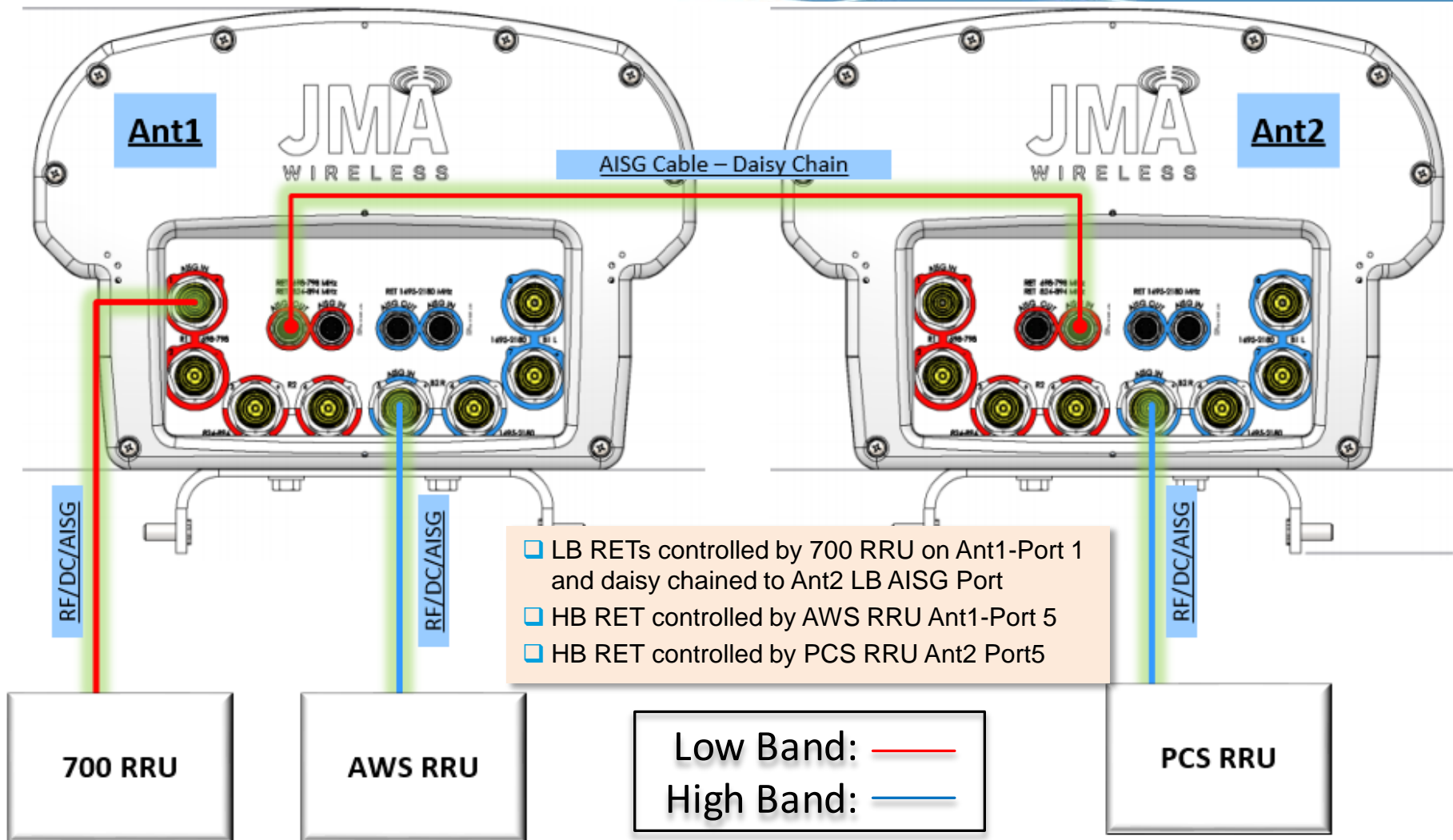
-Two LB ant  
 -Two HB ant

| Band      | RF Port |
|-----------|---------|
| 1695–2180 | 5–6     |
| 698–798   | 1–2     |
| 824–894   | 3–4     |
| 1695–2180 | 7–8     |





# RRU - RET CONNECTION DIAGRAM EXAMPLE

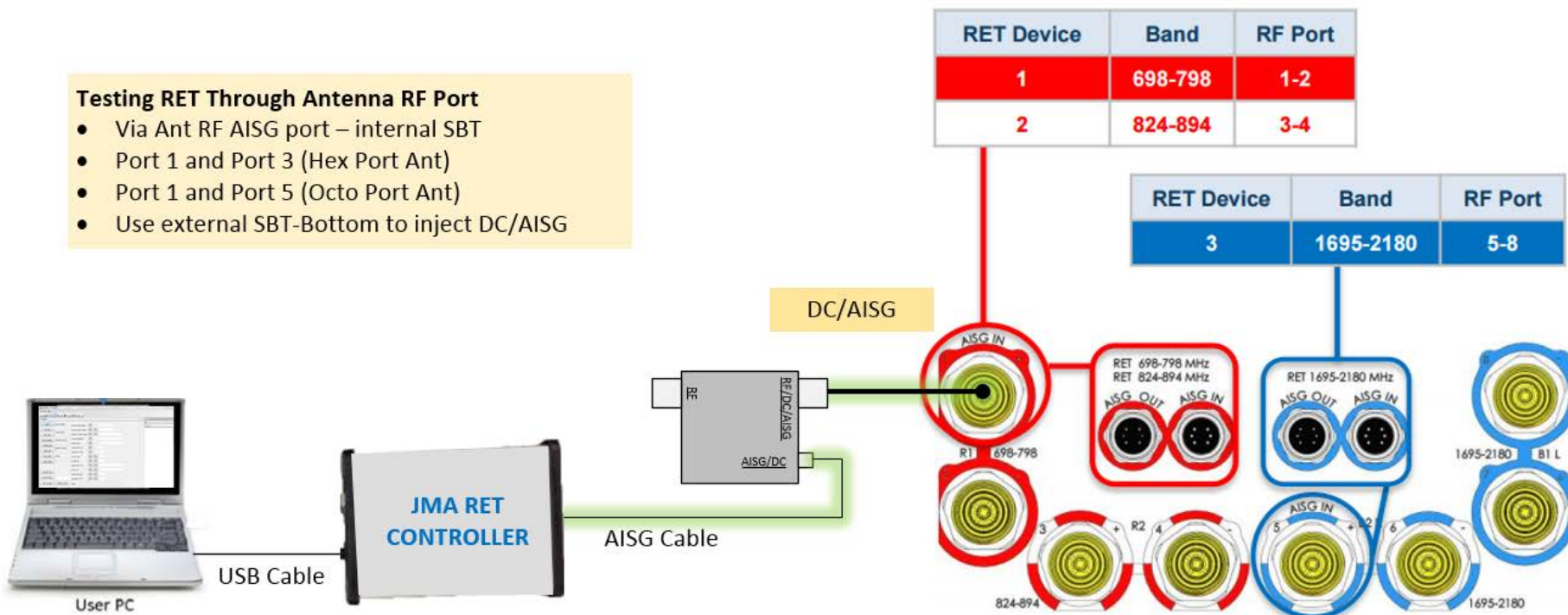


# RET CONTROLLER TEST DIAGRAM 1

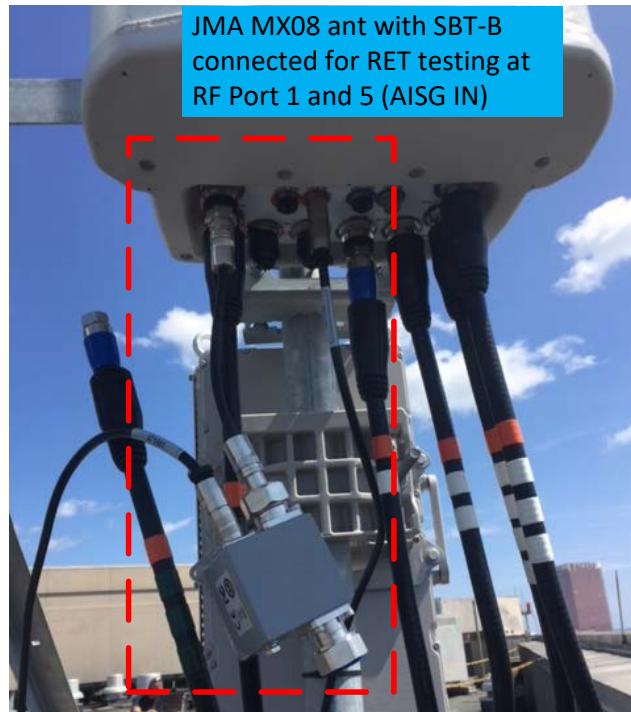
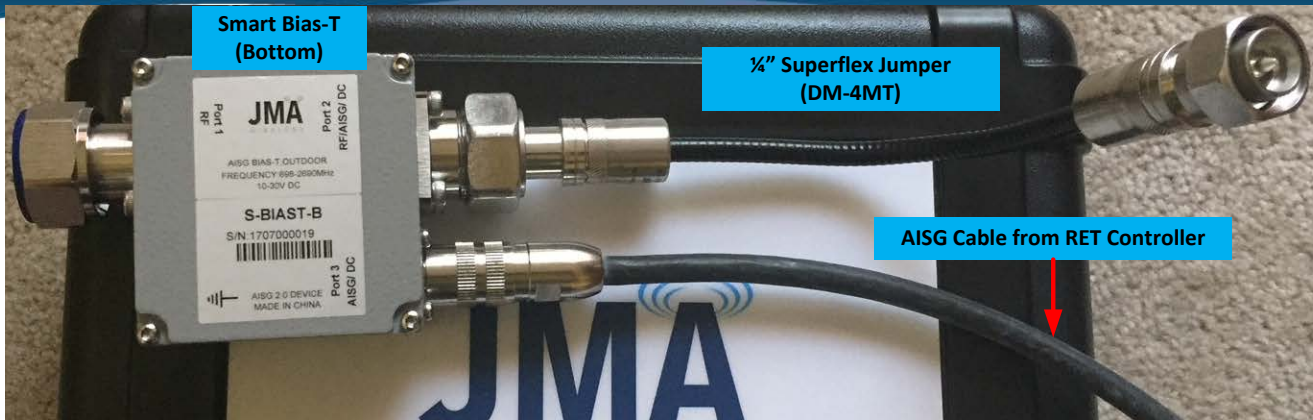
## (RF PORT – INTERNAL SBT)

### Testing RET Through Antenna RF Port

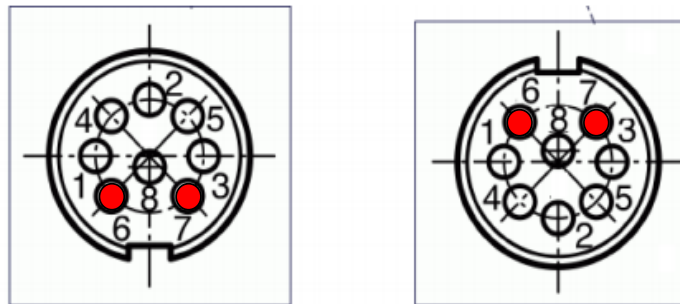
- Via Ant RF AISG port – internal SBT
- Port 1 and Port 3 (Hex Port Ant)
- Port 1 and Port 5 (Octo Port Ant)
- Use external SBT-Bottom to inject DC/AISG



# TEST KIT



## AISG Pin Connection



LOOKING INTO CONNECTORS

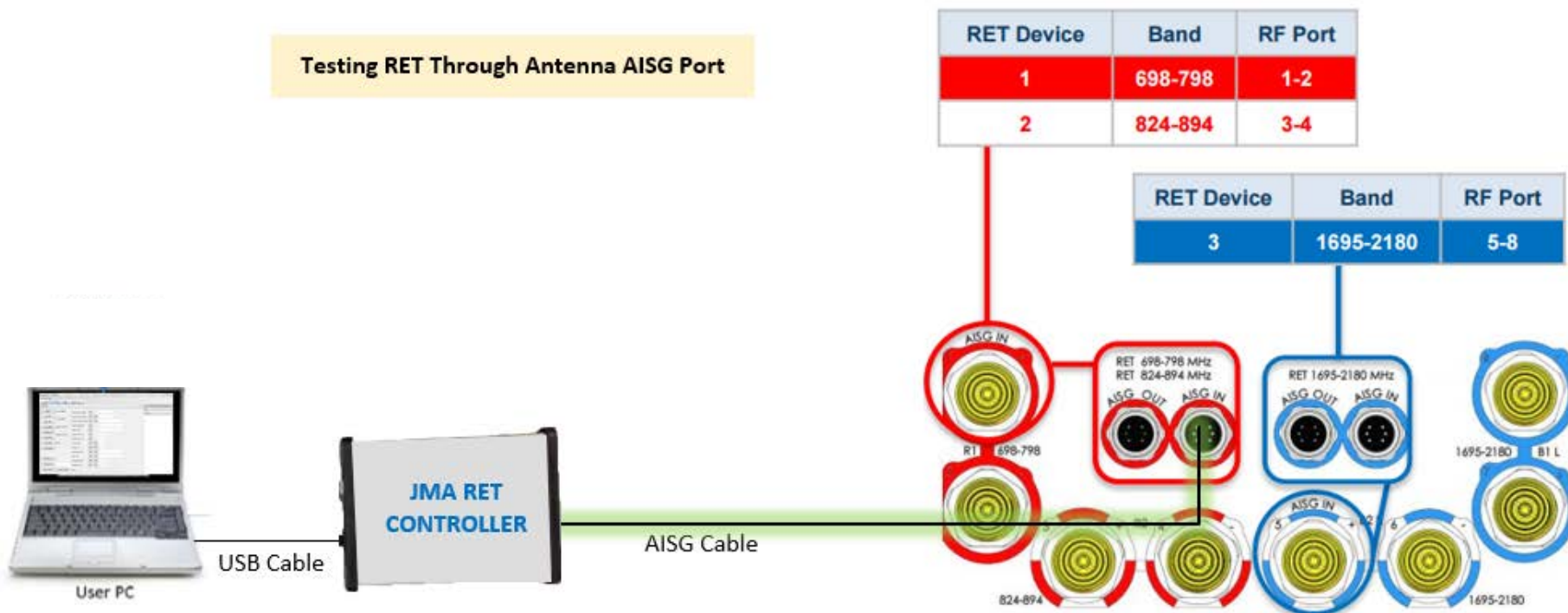
Pin Connections  
(as defined in AISG v2.0 Section 6.3.1)

| Pin Number | Signal (Function) |
|------------|-------------------|
| 1          | +12 VDC           |
| 2          | No Connection     |
| 3          | RS485 B           |
| 4          | No Connection     |
| 5          | RS485 A           |
| 6          | 10V - 30V DC      |
| 7          | DC Return         |
| 8          | No Connection     |



# RET CONTROLLER TEST DIAGRAM 2 (AISG PORT)

Testing RET Through Antenna AISG Port



# GROUND TESTING & COMMISSIONING

- ❑ Complete RET Worksheet
  - Ant Model and S/N
  - Tilt Range
  - RET S/N
  - Note Sector and Position
- ❑ Connect RET controller for testing
  - Commission the RET(s) according to RRU connection diagram – refer to test diagram 1 or 2
  - Daisy chain as required – Follow RRU connection diagram
  - Test with RET cables that will be part of the installation
- ❑ Detailed MOP on RET Controller and GUI operation is available on our website
- ❑ RET Test and Configuration
  - Scan to find connected RET(s)
  - Calibrate RET(s) if status is “Not Calibrated”
  - Set Tilt per RFDS
  - Enter configuration data– *Date, Installer & Site ID.....*
  - Save RET Report
- ❑ **Note:** Remember to use dielectric grease on **ALL AISG** Ports during the installation process.
  - **AISG Connection – hand tight only!**



# SAMPLE RET REPORT

| ADDRESS | STATUS    | TYPE         | VENDOR | RET UNIQUE ID       | PRODUCT NUMBER | SOFTWARE VERSION | HARDWARE VERSION | ALARM | RET TILT | ANTENNA MODEL NUMBER | ANTENNA SERIAL NUMBER |
|---------|-----------|--------------|--------|---------------------|----------------|------------------|------------------|-------|----------|----------------------|-----------------------|
| 1       | CONNECTED | SINGLE - RET | CC     | CC180208IOT20001-R1 | R1000          | DW_V1.2.0        | HW_R1000_C       | NONE  | 8        | MX08FRO660024R1      | TS-iRETDemo-12345     |
| 2       | CONNECTED | SINGLE - RET | CC     | CC180208IOT20001-R2 | R1000          | DW_V1.2.0        | HW_R1000_C       | NONE  | 6        | MX08FRO660024R2      | TS-iRETDemo-12345     |
| 3       | CONNECTED | SINGLE - RET | CC     | CC180208IOT20001-B1 | R1000          | DW_V1.2.0        | HW_R1000_C       | NONE  | 0        | MX08FRO660024B1      | TS-iRETDemo-12345     |

```

iRET Demo Report.txt - Notepad
File Edit Format View Help
#####
ADDRESS                , 1
STATUS                 , CONNECTED
TYPE                   , SINGLE RET
VENDOR                 , CC
RET Unique Id          , CC180208IOT20001-R1
PRODUCT NUMBER         , R1000
SOFTWARE VERSION       , Dw_V1.2.0
HARDWARE VERSION       , Hw_R1000_C
ALARM                  , NONE
RET TILT               , 8.0
ANTENNA MODEL NUMBER   , MX08FRO660024R1
ANTENNA SERIAL NUMBER , TS-iRETDemo-12345
ANTENNA FREQUENCY BAND, 12: 13: 14
ANTENNA BEAMWIDTH     , 60 0 0 0
ANTENNA GAIN           , 0.0 0.0 0.0 0.0
ANTENNA MAX TILT       , 14.0
ANTENNA MIN TILT       , 2.0
OPERATOR INSTALL DATE , 030518
OPERATOR INSTALL ID   , 1234
OPERATOR BASESTATION ID,
OPERATOR SECTOR ID    ,
OPERATOR ANTENNA BEARING, 20.0
OPERATOR MECHANICAL TILT, 30.0
#####
ADDRESS                , 2
STATUS                 , CONNECTED
TYPE                   , SINGLE RET
VENDOR                 , CC
RET Unique Id          , CC180208IOT20001-R2
PRODUCT NUMBER         , R1000
SOFTWARE VERSION       , Dw_V1.2.0
HARDWARE VERSION       , Hw_R1000_C
ALARM                  , NONE
RET TILT               , 6.0
ANTENNA MODEL NUMBER   , MX08FRO660024R2
ANTENNA SERIAL NUMBER , TS-iRETDemo-12345
ANTENNA FREQUENCY BAND, 5: 15: 19
ANTENNA BEAMWIDTH     , 60 0 0 0
ANTENNA GAIN           , 0.0 0.0 0.0 0.0
ANTENNA MAX TILT       , 14.0
ANTENNA MIN TILT       , 2.0
OPERATOR INSTALL DATE , 030518
OPERATOR INSTALL ID   , 1234
OPERATOR BASESTATION ID,
OPERATOR SECTOR ID    ,
OPERATOR ANTENNA BEARING, 20.0
OPERATOR MECHANICAL TILT, 15.0
#####
0/1/2017

```

csv Format

Text Format



# SAMPLE RET REPORT

```

#####
ADDRESS                , 1
STATUS                 , CONNECTED
TYPE                   , SINGLE RET
VENDOR                 , CC
RET Unique Id          , CC180208IOT20001-R1
PRODUCT NUMBER        , R1000
SOFTWARE VERSION       , Dw_v1.2.0
HARDWARE VERSION      , HW_R1000_C
ALARM                  , NONE
RET TILT               , 8.0
ANTENNA MODEL NUMBER  , MX08FRO660024R1
ANTENNA SERIAL NUMBER , TS-iRETDemo-12345
ANTENNA FREQUENCY BAND , 12: 13: 14
ANTENNA BEAMWIDTH     , 60 0 0 0
ANTENNA GAIN          , 0.0 0.0 0.0 0.0
ANTENNA MAX TILT      , 14.0
ANTENNA MIN TILT      , 2.0
OPERATOR INSTALL DATE , 030518
OPERATOR INSTALL ID   , 1234
OPERATOR BASESTATION ID ,
OPERATOR SECTOR ID   ,
OPERATOR ANTENNA BEARING , 20.0
OPERATOR MECHANICAL TILT , 30.0
#####
ADDRESS                , 2
STATUS                 , CONNECTED
TYPE                   , SINGLE RET
VENDOR                 , CC
RET Unique Id          , CC180208IOT20001-R2
PRODUCT NUMBER        , R1000
SOFTWARE VERSION       , Dw_v1.2.0
HARDWARE VERSION      , HW_R1000_C
ALARM                  , NONE
RET TILT               , 6.0
ANTENNA MODEL NUMBER  , MX08FRO660024R2
ANTENNA SERIAL NUMBER , TS-iRETDemo-12345
ANTENNA FREQUENCY BAND , 5: 15: 19
ANTENNA BEAMWIDTH     , 60 0 0 0
ANTENNA GAIN          , 0.0 0.0 0.0 0.0
ANTENNA MAX TILT      , 14.0
ANTENNA MIN TILT      , 2.0
OPERATOR INSTALL DATE , 030518
OPERATOR INSTALL ID   , 1234
OPERATOR BASESTATION ID ,
OPERATOR SECTOR ID   ,
OPERATOR ANTENNA BEARING , 20.0
OPERATOR MECHANICAL TILT , 15.0
    
```

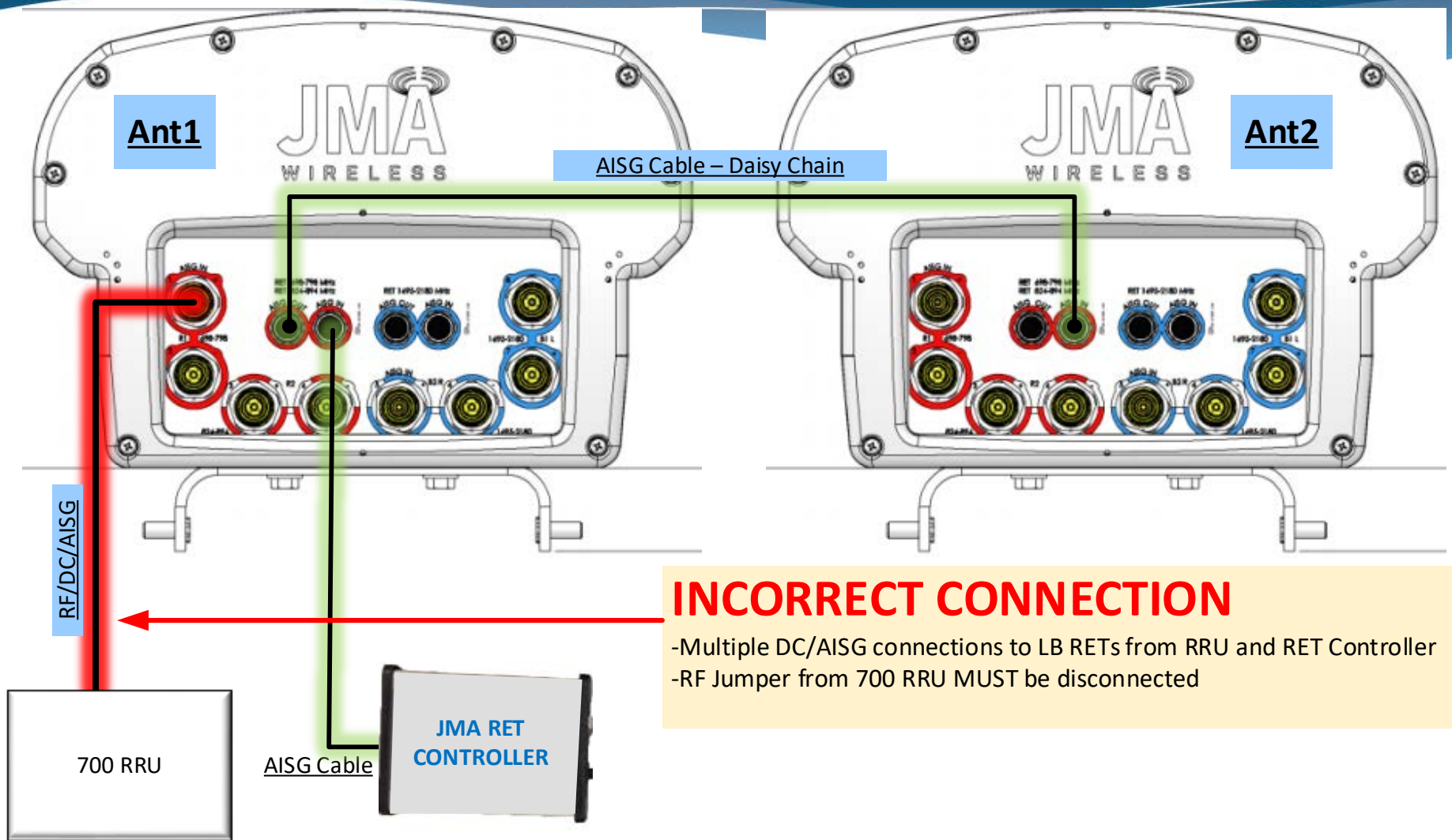
-Single RET – Type 1  
 -Internally mounted  
 -Not field replaceable

-UID must be 19 characters  
 -Vendor code “CC” for JMA/CSS

-Confirm the desired tilt per RET worksheet  
 -Verify installation and site info is correct

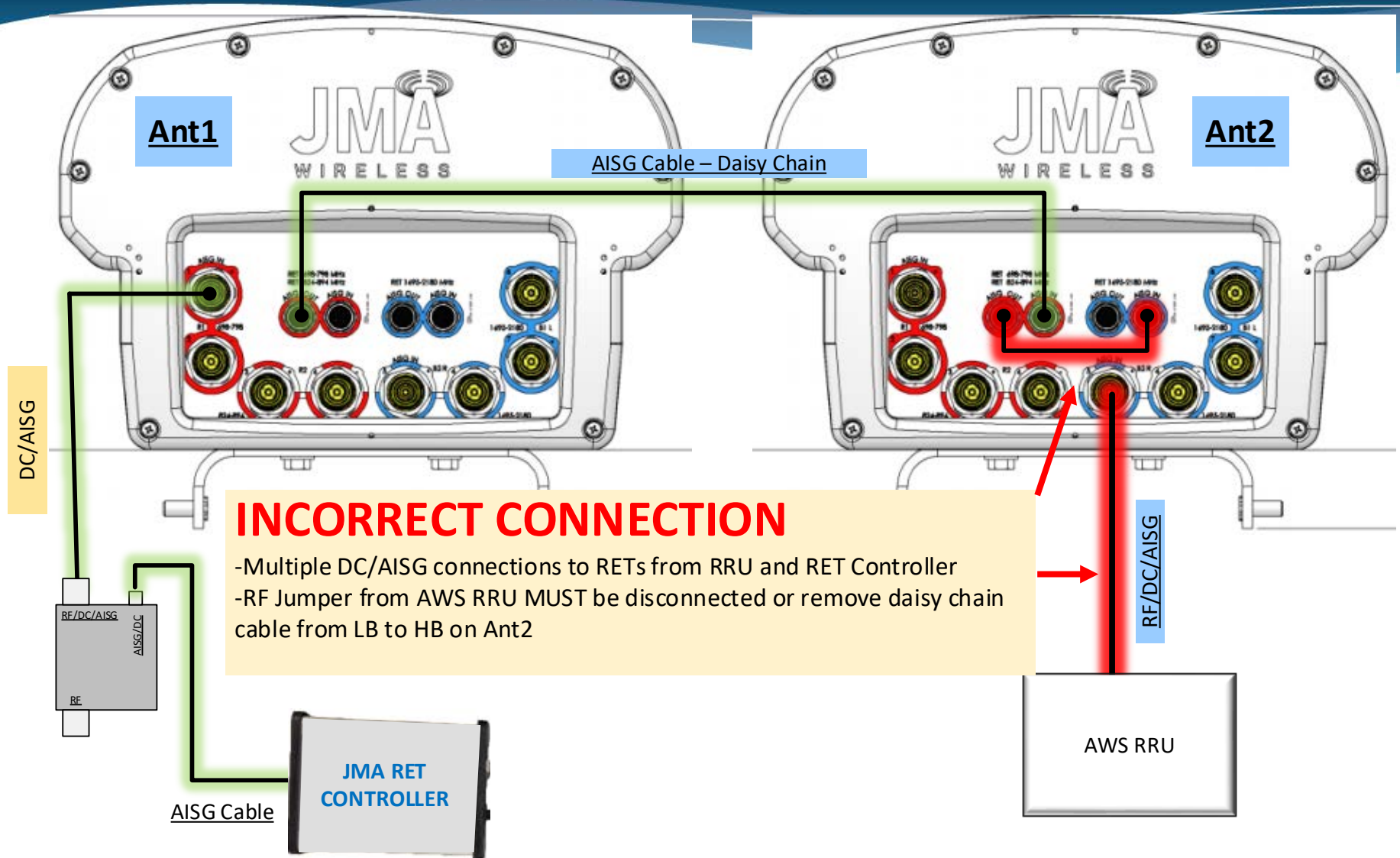


# INCORRECT CONNECTION – EXAMPLE 1

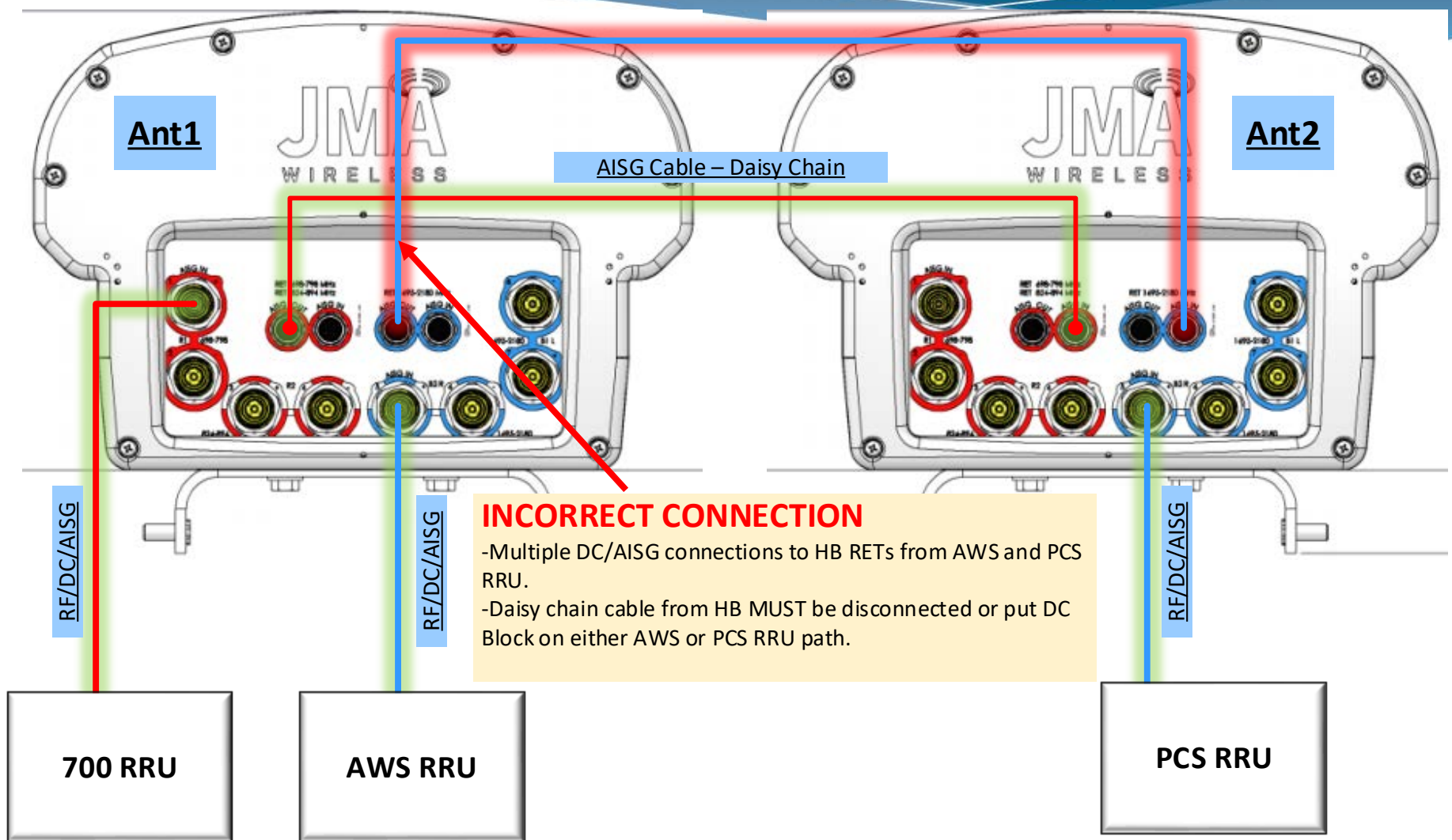




# INCORRECT CONNECTION – EXAMPLE 2



# INCORRECT CONNECTION – EXAMPLE 3



# TROUBLESHOOTING - RET CONTROLLER

- ❑ Cannot Discover RETs
  - Ensure the RET controller is the only DC/AISG source to the RET(s)
    - No RRU connection – refer to Incorrect Connection 1
    - Check the daisy chain – refer to Incorrect Connection 2
  - Verify Com setting is working properly on RET Controller
    - Verify alternating LED for Tx/Rx during the scan
    - Verify all connections are tight
  - If using SBT to connect to RF Port
    - Verify SBT connection – refer to Test Diagram1
    - Check DC/AISG pass thru for all ALDs (multi-band combiners, xplexers)
    - Bypass all ALDs and Isolate
  - Verify DC voltage on AISG cable/connector (Pin 6 & 7)
    - JMA RET Controller output is +24VDC
    - Refer to AISG Pin Connection diagram
    - Check for DC voltage on AISG port of Antenna



# TROUBLESHOOTING – Cont.

- RET-Actuator Jam
  - During Calibration
    - Try the calibration several times
    - Try Resetting the bus and re-calibrating
    - Still Jammed - Contact JMA Tech Support
  - During tilt adjustment
    - Verify the RET is Calibrated before setting tilt
    - Try Resetting the bus and re-calibrating
    - Still Jammed - Contact JMA Tech Support



# GUI OPERATION - iRET

AisgController - ALD #3

File View Alarm Controls Tools Help

R [Icons]

ALD LIST

| ALD | Unique Id           | Tilt |
|-----|---------------------|------|
| 1   | CC180208IOT20001-R1 | 2.0  |
| 2   | CC180208IOT20001-R2 | 5.0  |
| 3   | CC180208IOT20001-B1 | 4.0  |

ALD #1 ALD #2 ALD #3

**Info**

Product Number: R1000

RET Unique Id: CC180208IOT20001-B1

Firmware Version: FW\_V1.2.0

Hardware Version: HW\_R1000\_C

Alarm Status: None

**Antenna Fields**

Model Number: MX08FR066002481

Serial Number: TS-iRETDemo-12345

Frequency Band: 1, 2, 3, 4, ...

Beamwidth: 60 0 0 0

Gain: 0.0 0.0 0.0 0.0

Max Tilt: 9.0

Min Tilt: 0.0

**RET**

GET TILT    SET TILT    4.0

CALIBRATE    CALIBRATE ALL

ANT CONFIG DWN

FIRMWARE DWN

**Operator Fields**

Install Date: 021418

Install Id: 12345

Antenna Bearing: 220.0

Mechanical Tilt: 45.0

Base Station Id: JMA-Liverpool

Sector Id: Alpha1-AWS

Output

Open Save Run Clear

| Lev | Timestamp    | Class | ALD | Message                  |
|-----|--------------|-------|-----|--------------------------|
| 1   | 16:16:48:490 | POLL  | 002 | Polling Request          |
| 1   | 16:16:48:490 | COMM  | ... | TX[06] 7E 02 F1 F1 DA 7E |
| 1   | 16:16:48:566 | COMM  | ... | RX[06] 7E 02 F1 F1 DA 7E |
| 1   | 16:16:48:586 | POLL  | 003 | Polling Request          |
| 1   | 16:16:48:586 | COMM  | ... | TX[06] 7E 03 F1 29 C3 7E |
| 1   | 16:16:48:662 | COMM  | ... | RX[06] 7E 03 F1 29 C3 7E |



# JMA WEBSITE & SUPPORT

|                                     |   |
|-------------------------------------|---|
| <b>Support Hours</b>                | <ul style="list-style-type: none"><li>▪ Weekday Hours: 8AM to 5PM EST</li><li>▪ After Hours, Weekend &amp; Holiday Hours:</li><li>• Via Customer Service Representative (CSR) - 24X7</li></ul>  |
| <b>Phone Support</b>                | <ul style="list-style-type: none"><li>▪ 1-888-201-6073</li></ul>  |
| <b>Email Support &amp; Web Site</b> | <ul style="list-style-type: none"><li>▪ <a href="mailto:techsupport@jmawireless.com">techsupport@jmawireless.com</a></li><li>▪ <a href="mailto:customerservice@jmawireless.com">customerservice@jmawireless.com</a></li><li>▪ <a href="http://www.jmawireless.com">http://www.jmawireless.com</a></li></ul> |

SEARCH



HOME PRODUCTS INDUSTRIES **SUPPORT** ABOUT CONTACT

## Antenna Systems

- **RET Training Video**
- Fixed Tilt Product Selection Matrix
- RET Product Selection Matrix
- Antenna Model Nomenclature
- RET PCU-220 Controller Support
- RET-200 Motor Support
- Antenna Painting Options
- Stadium Antenna - Weep Hole Guide
- NWAV Macro Antenna Bracket Installation Guide

## RF Conditioning

- Multi-Band Combiner Matrix
- In-Band Combiner Matrix





Thank You

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