Tools & Materials Required

1. Windows Laptop
2. Standard & Metric Socket Sets & Wrenches (Alternatively adjustable wrenches can work)
3. Flat head and Philips Head screwdrivers
4. Hex head/Allen Wrenches; Standard & Metric
5. Wire Ties/Cable Ties
6. LMR-400 Cable prep tool and Crimpers
7. RJ-45 Crimp Tools and CAT5 cable prep tool/strippers
8. Ethernet Patch cable
9. Cisco Console Cable, USB to RJ45 Serial Adapter
10. RJ-45 cross-over cable (May not be necessary but good to have)
11. Ballast: Sandbags or concrete blocks to place on antenna mount. (local site POC may be able to help with this)
12. Satellite Modem Image (if required; modem will arrive with software/firmware pre-installed; (evo_x7_rmt-14.0.3.5.pkg)
13. Modem Options File. The iDirect modem options file will be distributed by the NOC prior or at the time of install.
14. Download iperf3 (Windows 32-bit or 64-bit depending on OS) on local laptop inside preferred directory. https://iperf.fr/iperf-download.php#windows
15. Create iperf3 folder in Root directory. Iperf3 must run from that directory via the command line. No Windows installer required or will load when double clicking .exe file.

⚠️ *If installing a wireless only site, ignore instructions regarding thin clients and VoIP phones.*

General Installation Procedure Overview

1. Install VSAT antenna, mount, outdoor electronics, cabling and ballast.
2. Install Indoor equipment rack
3. With Trace NOC, Perform Cross-pol and P1dB test using iSite
4. Verify Receive lock on the iDirect modem
5. **Disconnect Cat5 Ethernet cable from X7 LAN Port 1 to 2911 GE0/0 until after antenna and modem are commissioned.**
6. Reconnect internal UPS batteries (disconnected for shipment). For 9130 See manual Page 19. For 9PX See manual Page 21.
7. Install Thin Clients and cable to 2960-X Switch according to Port Diagram
8. Install VoIP Phones and cable to the embedded Ethernet switch in the 2911 router
9. Install Wireless Access Points and cable to the 2960-X Switch
10. Verify all equipment installed powers up and is ready for verification and validation testing
11. Execute Commissioning and Test Plan

Satellite Antenna and Mount

1. Assemble non-penetrating antenna mount
2. Orient the mount roughly toward the satellite according to the provided azimuth heading in the café IDP
3. Apply ballast to the antenna mount (Sandbags or concrete blocks)

4. Place AZ/EL mounting assembly on the mount pole. The elevation scale on the AZ/EL is for the boresight. The offset angle is included in this scale. Set elevation for actual value.
5. Attach reflector to Az/El mount
6. Install feed support arms and lower feed boom arm
7. Attached BUC and LNB to the feed assembly
8. Install feed assembly with BUC and LNC to the feed mounting bracket on the antenna system.
9. Install coax cable from the BUC and LNB to the TX (BUC) and RX(LNB) ports on the iDirect modem installed with the indoor equipment.
10. Connect laptop to the iDirect modem to begin the antenna pointing process.

⚠️ *Full band LNB is provided. (L) 10.7-11.7GHz L.O. 9750MHz; (H) 11.7-12.75GHz L.O. 10600MHz. NOC will provide site specific setting for LNB.*

Antenna Setup & Pointing Using iSite Web GUI (X7 Only)

1. Connect laptop to LAN port. A single DHCP address is issued to the laptop for commissioning purposes.
2. Factory default address is: https://192.168.0.1
3. Login using **admin** account. *iDirect* is the password.
4. Dashboard appears.
5. Navigate to Remote Information page to verify serial number and Software version with NOC.
6. Click on **Admin** button from Dashboard.
7. Click on **File Management**. Click on **Load Options File**.
8. Browse to local PC where Options File is located.
9. Click **Load** to load the options file. Wait for message saying the options file was saved successfully.
10. Navigate to **Restart Device**, then click **Restart.**
11. The iSite Web GUI session will terminate.
12. Open provided Options File in text editor.
13. Configure laptop on same subnet as ETH0_1 shown in options file. Log back in as **admin** to access the **Commissioning Page**.
14. Navigate to the **Commissioning Page** and click on **Geo Location.**
15. Enter in the site location Latitude and Longitude making sure to select appropriately Deg. North or South and Deg. East or West.
16. Click on **Angle Calculator** to calculate point angles**.**
17. Enter in the site location Latitude and Longitude making sure to select appropriately Deg. North or South and Deg. East or West.
18. Enter **IS-33e Spacecraft Position. 60 degrees East Longitude.**
19. **Gross Antenna Pointing page displays the Elevation,** Azimuth and Polarization Offsets for the antenna setup. The Installation Design Package Document contains the estimated azimuth, elevation and polarization settings.
20. Roughly point the antenna based on these look angles.
21. Click Commissioning, then click Antenna Pointing window in Dashboard
22. For X7 Modem click Rx1 in upper right corner.
23. **Disconnect TX coax cable from X7 modem. BUC voltage must be disabled.** Execute **Tx ifIDC off** on the console/command line.
24. Click **Start Tx PWM** in Antenna Pointing window.

25. Slowly sweep the reflector a few degrees either side of the coarse azimuth pointing while observing the voltage graph peak indicators. The bar graph progressively turns from red to yellow and then to green as downstream carrier signal strength increase.
26. Move the antenna azimuth as to maximize the level of the green bar and the PWM output voltage.
27. If the downstream carrier signal is not found, increase or decrease the elevation setting in 2 degree increments and repeat the azimuth sweep until the signal is found.
28. When locked on the carrier fine adjust the azimuth and elevation, then lock both the azimuth and elevation axis in place. Fine adjust the polarization via the feed assembly to maximize voltage.
29. Record the final voltage reading.
30. On **Antenna Pointing** screen click **Stop Tx PWM**.
31. Power cycle the modem to exit antenna pointing mode.

⚠️ *The modem provides DC Voltage to the BUC. Options File must be double checked to ensure TX IFL DC is on (*odu_tx_dc_power = 1*) after antenna pointing is complete.*

Cross Polarization Test

1. Call NOC. **NOC will remotely activate CW on the X7. If NOC is unable to remotely access the X7 then proceed with activating the CW locally using the following steps.**
2. Power down the modem and remove the RX IFL coax cable from the modem.
3. Connect the TX IFL cable to the BUC and modem.
4. Power on the modem
5. Connect via Web iSite and login as **Admin.** PW: *iDirect*
6. Click **Commissioning** from dashboard.
7. Click **Cross Polarization**.
8. Navigate to **Transmit Frequency** page. Enter in RF uplink frequency (Test frequency provided by NOC) and BUC Local Oscillating Frequency (12800MHz). The BUC LO may be present already if the Options File is loaded. The L-band TX frequency will be calculated automatically.
9. Make sure Modulation is *Off-CW.*
10. Set Tx Power to **-35dBm.**
11. When instructed by the NOC, click **Start.**
12. This activates a Continuous Wave (CW) carrier.
13. Adjust transmit power up or down with NOC in the recommended power increments.
14. At the instruction of the NOC, rotate the feed assembly slowly in one direction. Wait for the NOC to take a measurement and provide further instruction. Continue rotating the feed assembly in the direction specified until the peak value is attained.
15. Further adjustments to azimuth and elevation may be required. The NOC will make recommendations if further adjustments are necessary.
16. If the NOC determines that the antenna is peaked, then secure all fasteners.

1 dB Compression Point & Maximum Power

1. In **Transmit Power** field, increase power in 1dBm increments with the NOC.
2. Wait for measurement by NOC. If a 1dBm increase is observed, continue increasing in 1 dBm increments with the NOC until a non-linear response is measured.
3. Once the measured power does not reflect the 1dBm increase on the modem, the BUC is in the non-linear range. Increase as instructed by the NOC until asked to stop.
4. Begin decreasing power until a 1:1 ratio is observed between TX modem power adjustment and measure power reading on the satellite.
5. A 1 dBm increment down from this value is the 1 dB compression point. Record the Modem **Transmit Power** Value.
6. Click **Stop** to turn off the CW carrier.

Acquiring the Network
1. Remove power from the satellite modem.
2. Reconnect the RX IFL coax cable to the modem **RX In** port.
3. Reconnect power to the modem.
4. Monitor the modem LEDs or Web iSite dashboard to observe boot up and network acquisition progress. RX lock should be attained locking on the receive outbound carrier.
5. NOC will verify if they see the remote active in the network via iMonitor.
6. TX and Net LEDs will turn green.

Checking Remote Status
1. Login to modem as **admin**.
2. Click **Status** button in navigation bar then click **Modem Status**.
3. Good Status: Power, Status, Fan, Temp, RX1, TX and NET all green.

Wireless Access Points
1. Install and Mount Wireless access points using either the indoor mount or outdoor mount.
2. Connect Ethernet cable with weather tight connectors on the WAP. Install antennas to the top side N-Type Connectors (**Two antennas per WAP)** install weather tight Ethernet PoE connector, install antennas
3. Plug access points into designated ports on switch identified in the Installation Design Package (IDP).
4. WAP blinking green is online and ready. Solid green is not ready. (5-10 minutes to be ready)
5. SSID: **MWRCAFE**; PW: **MWRU$3r!** (all WAPs, all cafes)

Café Commissioning
1. Once the satellite modem is active, notify the NOC start the software download and café commissioning process.
2. The café must receive a software update for the captive portal. The NOC will initiate the captive portal equipment update over the satellite link.
3. The NOC will verify the thin client image and VoIP firmware. Connectivity/ping tests will be performed by the NOC to test connectivity to remote café managed devices. This will verify the Management VLAN connectivity.

Testing
1. Follow test procedures as outlined.
2. Local PC/Laptop must be plugged into switch emulating local thin client. A DHCP address will be issued to local test PC. For wireless site, local laptop will receive DHCP address from wireless network.
3. Access iperf folder on laptop via the **command line** to start iperf3 tests. For example:
   a. `C:\CHDIR C:\iperf3`
   b. `C:\iperf3>iperf3.exe`
4. Run 90 second iperf3 bandwidth test in either direction from remote café accessing the Trace iperf3 server. This confirms access to Internet and CIRs in both directions per café. Ping Trace iperf3 Server: "47.206.2.150":
   a. Test from café to server: `iperf3 -c 47.206.2.150 -p 55201 -t 90 -i 2 --logfile` *[sitename]*`.txt`
   b. Test from server to café: `iperf3 -c 47.206.2.150 -p 55201 -t 90 -i 2 -R >>`*[sitename]*`.txt`
5. Executing these commands starts iperf3 test and exports results to log file in the iperf3 directory on local PC.
6. Create one iperf file for wired connections and a second file for wireless connections.
7. Execute the two commands in sequence to establish the logfile (a) and then the second command to add to the logfile (b).

⚠️ *Check the log file for data. It may take several attempts for the public server to respond.*

8. Verify the test results.
9. Send test plan results and iperf3 log file to the NOC.

Post-Commissioning Activities
1. Document site configuration for updates to the IDP.
   a. Photos of site including indoor and outdoor equipment if permissible
   b. Update floor plan to show placement of equipment and general site layout (rack equipment location, thin clients placement and phones)
   c. Power Connections and Power Type
2. Compile site information and send to Trace NOC.
3. Instruct Site POC on the café setup and location of equipment
4. Provide basic training on creating an account and the wireless network SSID

Government Acceptance
1. Perform Site Walk Through and Inspection
2. Display executed test plan to Site POC.
3. Show iperf3 bandwidth test results to Site POC
4. Gain concurrence site has been accepted through verbal or written acceptance (email, text)
5. Do not leave behind IDP or test plan.