WILDBLUE PRODUCTS AND SERVICES PRIMER

SUMMARY

This Installation Primer covers:

WILDBLUE COMMUNICATIONS WHO WE ARE

- The following information discusses the WildBlue Communications corporate misson and vision.

Step By Steps

On July 17th, 2004, WildBlue/Telesat successfully launched the Anik F2 satellite - the world's largest commercial communications satellite. Telesat's Anik F2 is the first satellite to fully commercialize the **Ka frequency band** (20 to 30 GHz).

WildBlue-1, WildBlue's second satellite, built by Space Systems / Loral, will launch in late 2005 or early 2006.

WildBlue's mission is **"To Make Affordable Broadband Internet Access Available to Everyone."**

Service:

- WildBlue provides an <u>always-on</u>, broadband Internet service that is comparable to DSL or cable modem services, and is up to 25 times faster than Internet access via dial-up modem.
- WildBlue service will come with Email, Web space and other ISP services bundled in at no additional cost.
- The WildBlue service will primarily target the 30 million customers living in small towns and rural America.

Technology:

- Anik F2 and WildBlue-1 will use Ka-band "spot beam" technology to allow multiple re-use of the same frequency, providing high capacity at low cost.
- The DOCSIS® cable modem and the digital broadcast satellite standards form the technical basis of WildBlue's Satellite Modem and Gateway Earth Stations.
- WildBlue will use a small 26″ satellite antenna equipped with both a satellite transmitter and receiver for two-way satellite connectivity to the Internet.

WildBlue is:

- **Always On***:*
  o WildBlue offers a connection that is 'always on' – no wait times, no dial-up hassles, no extra steps.

- **Fast:**
  o WildBlue's broadband services will give you downlink speeds of up to 1.5 Megabits per second and 256k on the uplink.

WILDBLUE SERVICE

- The following information discusses the various WildBlue Communications service offerings for both Wholesale and Retail.

Step By Steps

WildBlue offers three Packages with Downstream speeds up to 1.5 Mbps and upload speeds up to 256 Kbps. Each package has two offers; one for WildBlue Retail Partners and one for WildBlue Wholesale Partners.

Retail Included Features:

• "Always on" technology	• Virus Protection
• Broadband Downstream	• High Speed to Broadband Upstream
• *Email* • Email Virus protection and Spam Filtering	• Web space with authoring tools
• WildBlue Portal	• News Groups
• Professional Installation	• 24X7 Customer Care
• Warrenty	•

Good	Better	Best
WildBlue Value Service	**WildBlue Select Service**	**WildBlue Pro Service**
Up to 512Kbps downstream 128 Kbps upstream 5 Email addresses 10MB per Email address 10MB of Web space	Up to 1.0Mbps downstream 200 Kbps upstream 5 Email addresses 10MB per Email address 10MB of Web space	Up to 1.5Mbps downstream 256 Kbps upstream 10 Email accounts 15MB per Email address 20MB of Web space 10 hours of dial-up access

"A La Carte"

5 email accounts with 10MB storage
10MB additional storage per email
10 hour package of dial-up (**Add on for Value and Select**)
Additional 10MB of web space (**Select & Pro Service Only**)

*NOTE: Addition cost required

Wholesale Included Features:

• "Always on" technology	• Virus Protection
• Broadband Downstream	• High Speed to Broadband Upstream

Good   Better   Best

WildBlue Value Service	**WildBlue Select Service**	**WildBlue Pro Service**
Up to 512Kbps downstream 128 Kbps upstream	Up to 1.0Mbps downstream 200 Kbps upstream	Up to 1.5Mbps downstream 256 Kbps upstream

NOTE: Wholesale ISP and Email services provided by WildBlue Partner.

WildBlue Motto:

"Making Affordable Broadband Internet Access Available To Everyone"

WILDBLUE COMMUNICATIONS NETWORK

- The following information discusses the WildBlue Communications network.

Step By Steps

Anik F2 Satellite

Anik F2 satellite's mission is to provide Ka-band data services across North America. The satellite operates at the orbital slot of 111.1 degrees West longitude. The Satellite uses two important technologies to provide services:

- **Spot Beam Technology:** To provide service that is optimized for broadband, Anik F2 uses thirty six (36) narrow **Spot Beams** that point at different geographic regions, instead of using one single **CONUS** beam. As discussed in the previous Part, Anik F2 uses thirty six (36) narrow spot beams.

  o Thirty-one (31) Subscriber Segment spot beams
  o Five (5) Gateway Earth Station (GES) Segment spot beams

- **Bent-Pipe Architecture:** Anik F2 is a bent pipe architecture satellite with no on-board protocol processing capabilities. The satellite simply receives, retunes, amplifies, and redirects the RF signals between the CPE and a dedicated GES linked to the Internet backbone (see Graphic below). All digital signal-processing operations can be on the ground making the network easier to upgrade and maintain.
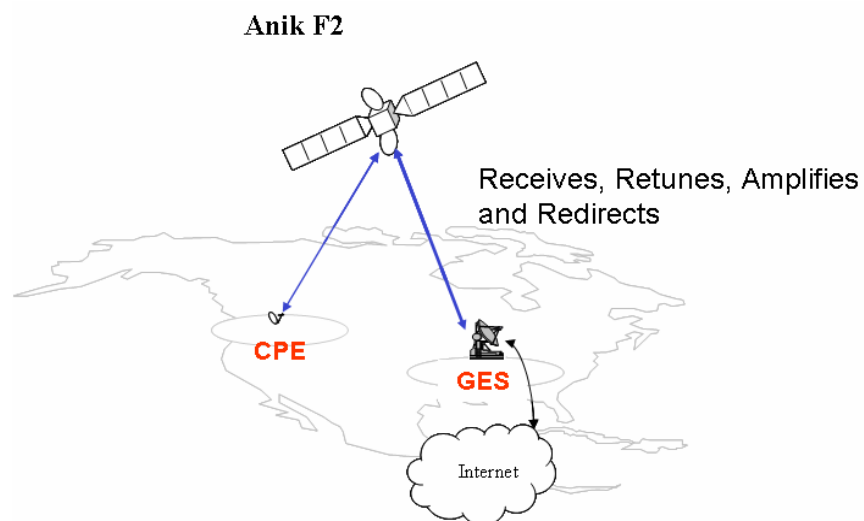
Gateway Earth Station (GES)

An integral part of each WildBlue Gateway Earth Station GES is the **Satellite Modem Termination System - Network-Side Interface (SMTS-NSI)**, usually referred to as the "SMTS". Like the Satellite Modem (SM), the SMTS is based on the open **Data Over Cable Service Interface Specification** (DOCSIS) standard (1.1). The SMTS not only receives and transmits data to Anik F2, it also performs:

- All real-time scheduling of over the satellite traffic
- Provides air interface control for the network
- Provides the physical LAN interfaces
- Converts RF signals (transmitted to and received from the satellite) to the IP data packets carried by the Internet backbone
- Content caching (storage of commonly requested Web pages)
- Access centralized services such as Email, Web hosting, and support functions

The WildBlue earth network consists of five (5) GES located in:

- Cheyenne, WY
- Riverside, CA
- Laredo, TX
- Syracuse, NY
- Winnipeg, CAN

Each of the five (5) GES beams supports a portion of the thirty-one (31) subscriber spot beams. (see Graphic below).

GATEWAY BEAM ASSIGNMENT
1. Cheyenne, WY
2. Riverside, CA
3. Laredo, TX
4. Syracuse, NY
5. Winnipeg, CAN
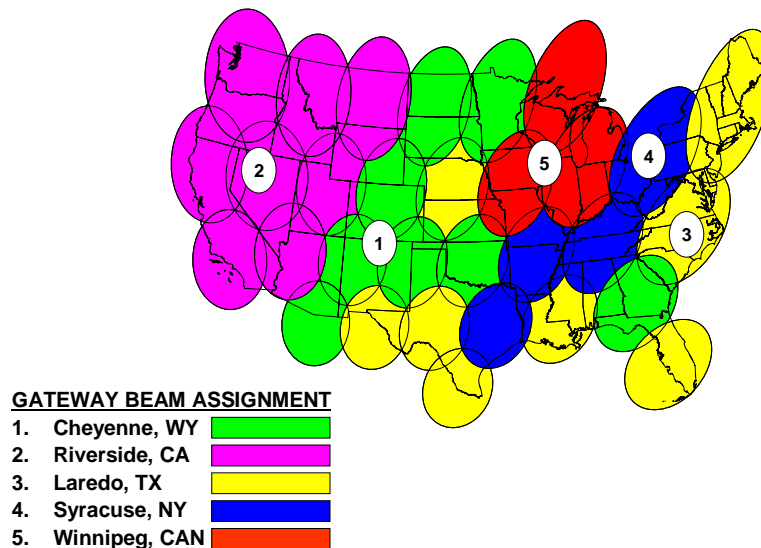
INDOOR UNIT IDU

- The following information discusses the features of the WildBlue Communications Indoor Unit (IDU)
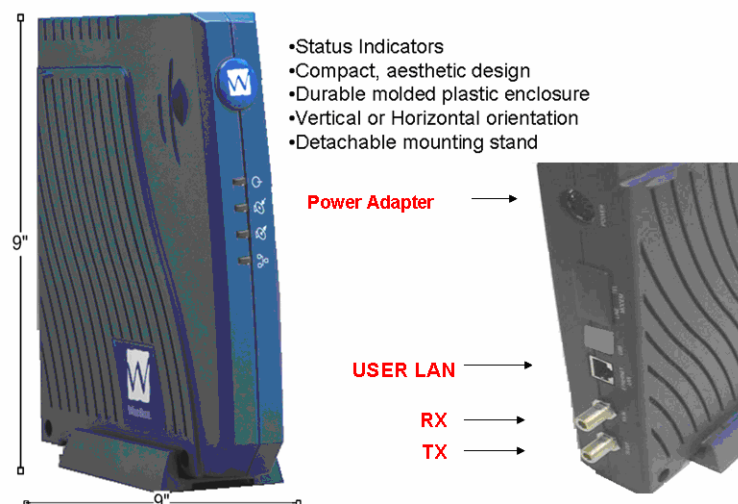
Step By Steps

Satellite Modem (SM)

The Indoor Unit (IDU) is one of the two units that form the **Satellite Modem-to-Customerpremises-equipment Interface (SMCI).** As the primary component of the IDU, the SM provides the interface to the satellite uplink/downlink, and transport of satellite transmission. The SM is located inside at the customer's home or facility and connects to the SMCI Outdoor unit (ODU) through using one **Transmit** (TX) COAX cable run and one **Receive** (RX) COAX cable run. In addition, the SM connects to the customer's **Internet Ready Device (IRD)**, usually a **Personal Computer (PC)**, using an **Ethernet** cable.

> *IMPORTANT: The COAX cable must be a WildBlue Approved cable model. These models will properly support the TX-Intermediate Frequency (IF) of 2225 MHz and RX-IF of 1450 MHz required by the Ka-band SM. In addition, the cable must be 150 feet, or less, to prevent the SM-to-ODU voltage-drop on the TX run from exceeding 6.7 VDC limit.*

The SM provides:

- High Speed Modulation/Demodulation
- MAC-layer processing
- CPE LAN and ODU Interface
- LED status indicators
- Supports DOCSIS Standard (1.1) and TCP/IP Protocols
- Connection to the ODU Feed cabling using COAX Extension cables
- Connection to the customer's IRD using an Ethernet cable

•Status Indicators
•Compact, aesthetic design
•Durable molded plastic enclosure
•Vertical or Horizontal orientation
•Detachable mounting stand

Power Adapter

USER LAN

RX

TX

9"

9"

OUT DOOR UNIT ODU

- The following information discusses the features of the WildBlue Communications Outdoor Unit (ODU)

Step By Steps

Antenna Assembly

The Outdoor Unit (ODU) is one of the two units that form the **Satellite Modem-to-Customerpremises-equipment Interface (SMCI).** As the primary component of the ODU, Antenna Assembly receives both Ka-band and KU- band***** downlink signals propagating in either a **Right-Hand Circular Polarization** (RHCP) or **Left-Hand Circular Polarization** (LHCP) sense. In addition, its Ka-band transmit uplink can be either RHCP or LHCP.

*NOTE: Future DBS upgrade kit (DUK) required

The Antenna Assembly is located outside at the customer's home or facility and connects directly to the IDU using one **Transmit** (TX) COAX cable run and one **Receive** (RX) COAX cable run.

The Antenna Assembly consists of four main components (see graphic below)
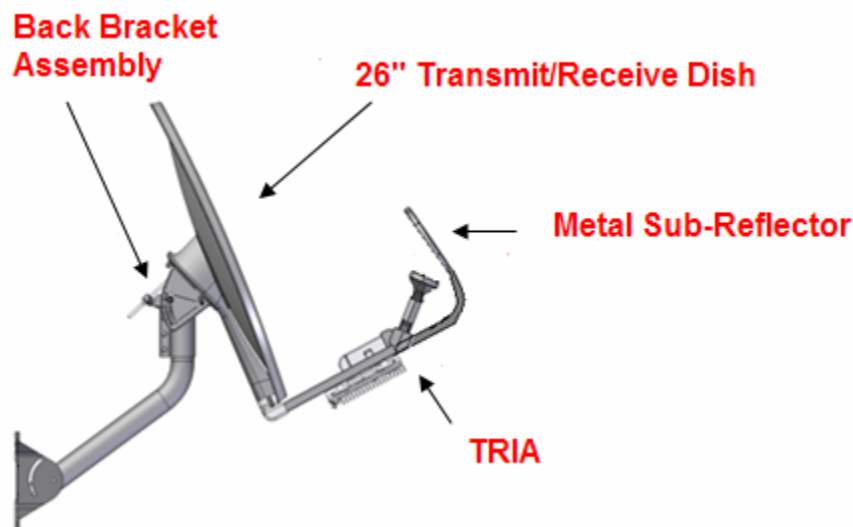
| Antenna Component	Function
Back Bracket Assembly	• Mount Antenna Assembly to pole • Set elevation, azimuth and skew
26" Transmit/Receive Dish	• Capture and reflect carrier signal
Metal Sub Reflector	• Reflects KA-band carrier signal to TRIA
Transmit Receive Integrated Assembly (TRIA)	• Transmits and Receives carrier signals

TRIA PRE JUNE 1 2005

- The following information discusses the features of the WildBlue Communications **Transmit Receive Integrated assembly (TRIA)** used for installations before June 1, 2005.
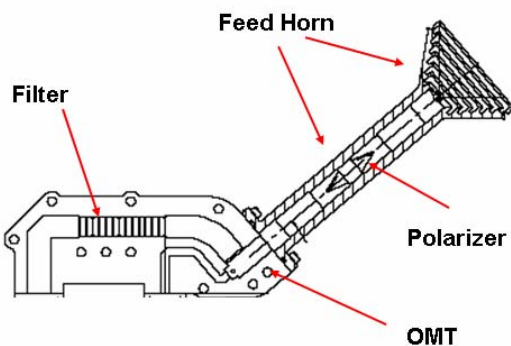
Step By Steps

The TRIA (Pre-June 1, 2005) is located under the boom arms that support the Sub-reflector and consists of two main components (see Graphic below).

Feed Assembly Subsystem (FAS)

Ka-Band Transceiver
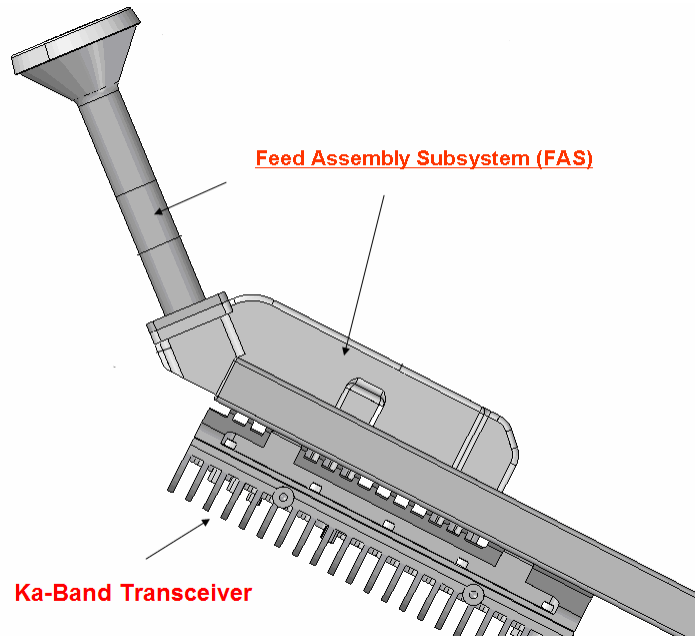
TRIA

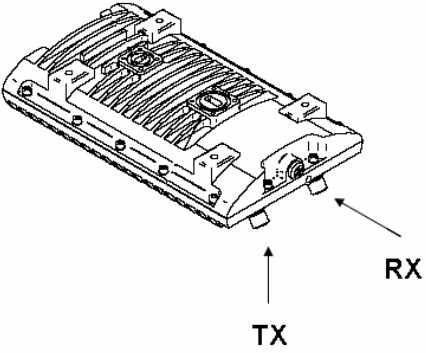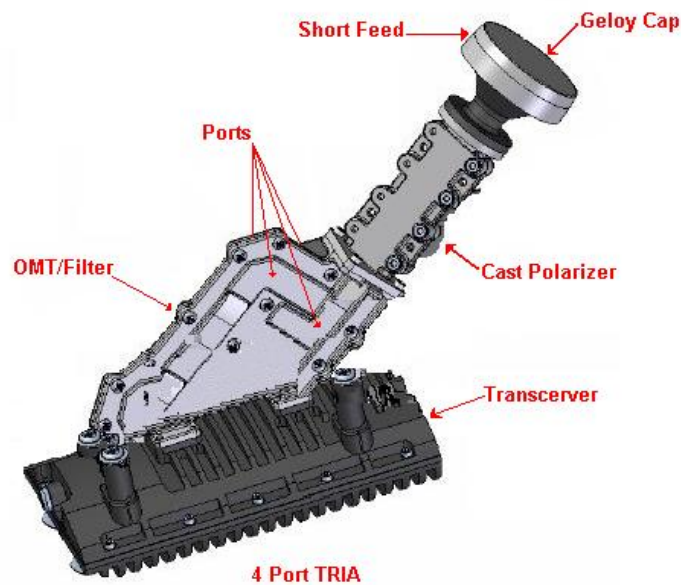| **Feed Assembly Subsystem (FAS)** (Directs, separates and filters RF signal)	**Feed Horn**: *Transmit* -Directs the RF signal to the sub reflector *Receive*- Captures the RF signal from the sub reflector **Polarizer: (Located inside Feed)** *Transmit*- Takes the Horizontal Polarized signal and converts it to LHCP *Receive*-Takes the RHCP signal and changes it to Vertical Polarization **OMT (Ortho Mode Transducer):** *Transmit*- Directs the 30 GHz signal from the Ka-band Transceiver to the Polarizer. *Receive*- Directs the 20 GHz signal from the Polarizer to the RX port on the Transceiver.

|	**Filter:** ***Transmit***- Provides TX signal Isolation for the RX port on the Transceiver. ***Receive***- N/A
Ka-Band Transceiver (Connects to the SM via RX/TX COAX cable) 	***Transmit***- Up converts the **Intermediate Frequency (IF)** (2225 MHz) to **Radio Frequency (RF)** (29.5-30 GHz) from the SM and directs it to the FAS ***Receive***- Down converts the **RF** (19.7-20.2 GHz) signal from the FAS to the **IF** (1450 MHz), then amplifies the signal and directs it to the RX port on the Transceiver.

4PORT TRIA POST JUNE 1 2005

- The following information discusses the features of the WildBlue Communications **Transmit Receive Integrated assembly (TRIA)** used for installations after June 1, 2005.

Step By Steps

The TRIA is located under the boom arms that support the Sub-reflector and consists of two main components. The Feedhorn is either positioned for RHCP or LHCP denoted by looking into the horn. (see Graphics below).
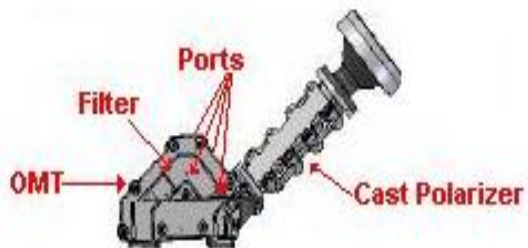
RHCP Feedhorn Position

TX: RHCP
RX: LHCP

LHCP Feedhorn Position

TX: LHCP
RX: RHCP
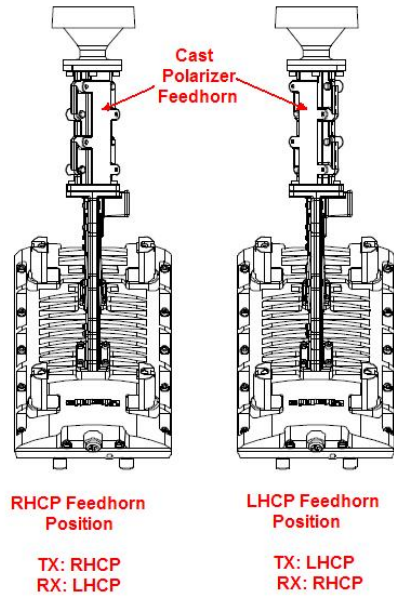
4 PORT TRIA

| **Feed Assembly Subsystem (FAS)**
(Directs, separates and filters RF signal)

 | **Feed Horn**:
Cast Polarizer
Transmit -Directs the RF signal to the sub reflector
Receive- Captures the RF signal from the sub reflector
Polarizer: (Located inside Feed)
Cast Delay Line Polarizer
Transmit- Takes the Horizontal Polarized signal and converts it to LHCP
Receive-Takes the RHCP signal and changes it to Vertical Polarization
OMT (Ortho Mode Transducer):
4 Port OMT – Addition of two dampening ports improves signal separation-
Transmit- Directs the 30 GHz signal from the Ka-band Transceiver to the Polarizer.
Receive- Directs the 20 GHz signal from the Polarizer to the RX port on the Transceiver
Filter:
Transmit- Provides TX signal Isolation for the RX port on the Transceiver.
Receive- N/A |
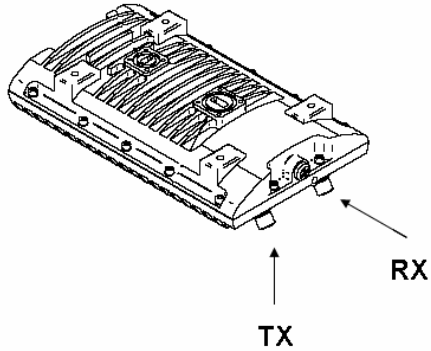
<u>Ka-Band Transceiver</u> (Connects to the SM via RX/TX COAX cable) RX TX	*Transmit*- Up converts the **Intermediate Frequency (IF)** (2225 MHz) to **Radio Frequency (RF)** (29.5-30 GHz) from the SM and directs it to the FAS *Receive*- Down converts the **RF** (19.7-20.2 GHz) signal from the FAS to the **IF** (1450 MHz), then amplifies the signal and directs it to the RX port on the Transceiver.

TRIA POLARIZATION VERIFICATION

- The following information discusses a the process to verify the polarization position of the TRIA feedhorn. This position directly affects the ability of the TRIA to acquire signal from the Anik F2 satellite. .

Step by Steps:

NOTICE: All installers will verify the position of the TRIA Feedhorn before starting the Base Assembly process.

The current WildBlue satellite, Anik F2, is a right-hand polarized satellite; therefore, the TRIA **Feed Assembly Subsystem (FAS)** needs to have the Feedhorn in the right-hand polarized position. In a recent production runs, some TRIA where manufactured with the Feedhorn in the left-hand polarized position. To prevent this from becoming an issue during installation, the installer will verify the Feedhorn polarization position.

Step 1. A *Correctly Positioned Feedhorn* will have the Feedhorn Notch on the bottom or the top of the Feedhorn base.

- **Feedhorn in correct bottom position:** The Feed horn is attached to the OMT with the Feedhorn Notch on bottom of Feedhorn base. (see Graphic below)
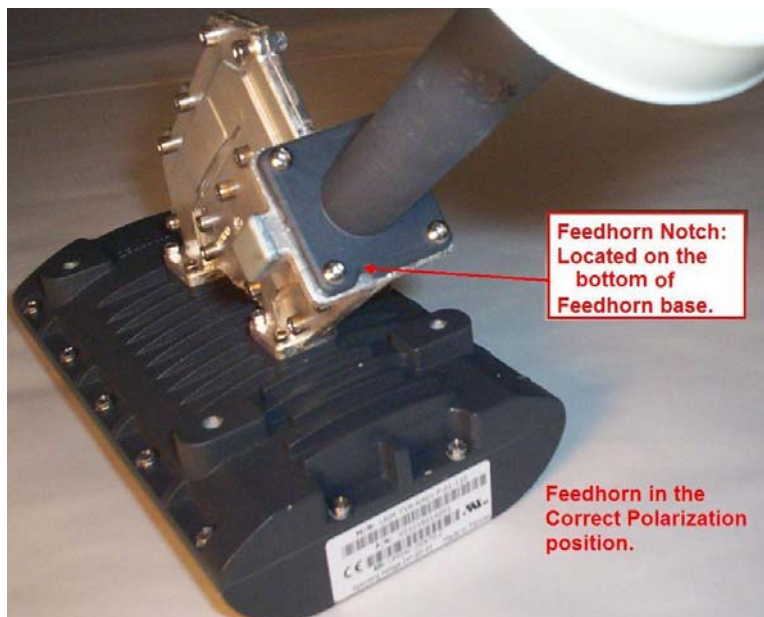
- **Feedhorn in correct top position:** Feedhorn is attached to the OMT with the Feedhorn Notch on top of Feedhorn base.
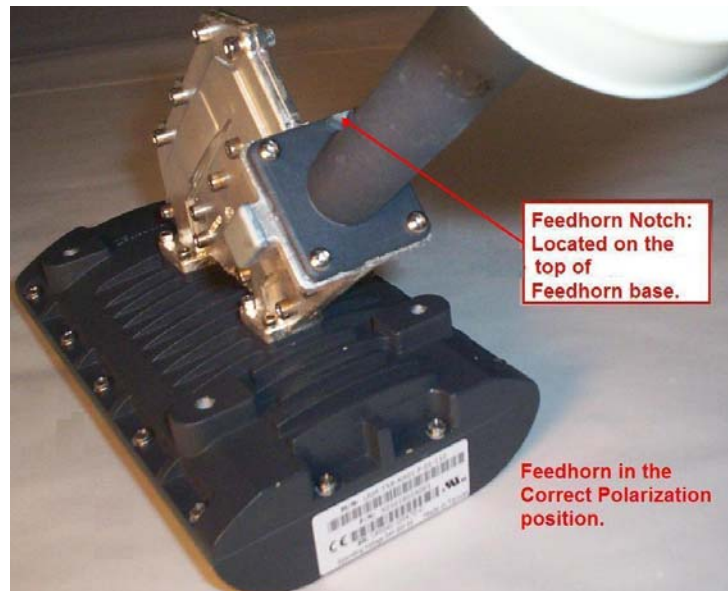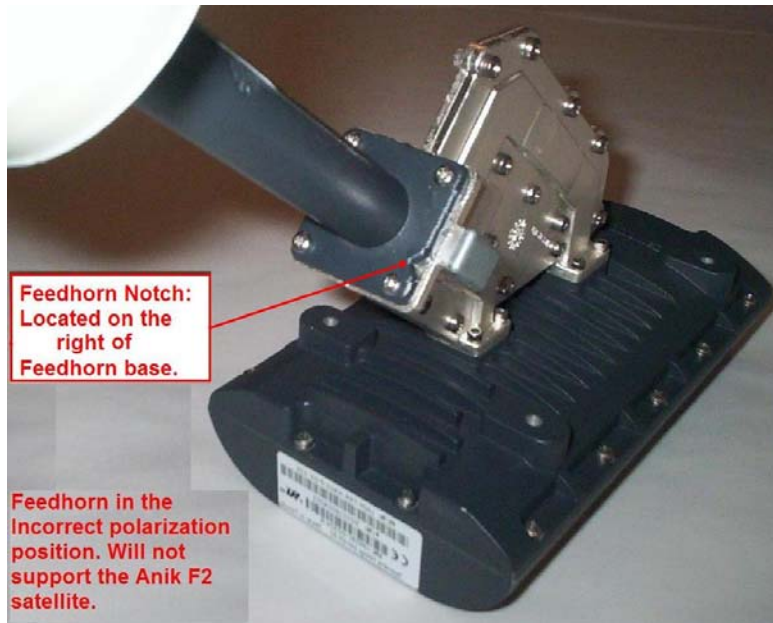

Step 2. An *Incorrectly Positioned Feedhorn* will have the Feedhorn Notch on the right or the left of the Feedhorn base.

- **Feedhorn in incorrect right position:** Feedhorn is attached to the OMT with the Feedhorn Notch on right of Feedhorn base.(see Graphic below)

- **Feedhorn in Incorrect left Position:** Feedhorn is attached to the OMT with the Feedhorn Notch on left of Feedhorn base.(see Graphic below)

Feedhorn Notch: Located on the right of Feedhorn base.

Feedhorn in the Incorrect polarization position. Will not support the Anik F2 satellite.

NOTICE: If the Feedhorn is incorrectly positioned the installer will not correct the problem in the field. The installer will obtain a replacement TRIA from the Truck Spares, or from their associated dealer or member.

REMINDER: Follow the standard Return Material Authorization (RMA) process for both WildBlue and the Associated WildBlue partner to replace Truck and/or dealer/member stock. The failure feedback on the RMA form should read: "Incorrectly positioned feedhorn".

Notes: [KB Articl:2111]

- *NOTICE: This primer will help the installer be better equipped to accomplish the Satellite Provisioning and service trouble shooting required of a WildBlue Installer.*