Appendix O: Base Station Installation Certification

Navini NETWORKS™

Internet at the speed of thought™

COMPANY _____
SITE NAME _____
SITE NO _____
LOCATION _____
NETWORK ID _____
EMS ID _____

BTS SITE COMPLETION CERTIFICATION (40-00092-00 Rev 1.10)

SITE TYPE	OTHER			
ANTENNA TYPE	OMNI			
ANTENNA AZIMUTH		DEGREES		
BTS CHASSIS TYPE	Combo			
FREQUENCY BAND	2.4 ISM			
BTS CENTER FREQUENCY		GHz		
RFS ELECTRICAL DOWNTILT	2	DEGREES		
RFS MECHANICAL TILT	0	DEGREES	☐ Uptilt	☐ Downtilt
RFS OVERALL DOWNTILT		DEGREES		
BTS ENCLOSURE	INDOOR			

A	**Equipment Installed in Building**	☐ YES	☐ NO	
1	Equipment Installed and Secured Per Plan	☐ YES	☐ NO	☐ N/A
2	Roof/Ceiling/Wall Penetrations Patched, Sealed and Painted	☐ YES	☐ NO	☐ N/A
3	Penetration(s) Inspected by Landowner Representative	☐ YES	☐ NO	☐ N/A
B	**Equipment Installed on Roof**	☐ YES	☐ NO	
1	Equipment Installed and Secured Per Plan	☐ YES	☐ NO	☐ N/A
2	Structural Upgrades to Roof Installed Per Plan	☐ YES	☐ NO	☐ N/A
3	Equipment Support Frame Installed	☐ YES	☐ NO	☐ N/A
C	**Equipment Installed on Grade**	☐ YES	☐ NO	
1	Equipment Installed and Secured Per Plan	☐ YES	☐ NO	☐ N/A
2	Special Inspection for Foundation Steel Complete	☐ YES	☐ NO	☐ N/A
3	Concrete Placed and Vibrated	☐ YES	☐ NO	☐ N/A
4	Concrete Break Test Report Complete	☐ YES	☐ NO	☐ N/A
D	**Civil/Site Work**			
1	Fencing Complete (Tie-In to Ground System) Per Plan	☐ YES	☐ NO	☐ N/A
2	Gravel/Crushed Rock Placed over Weed Barrier	☐ YES	☐ NO	☐ N/A
3	Above Ground Conduits Installed Plumb	☐ YES	☐ NO	☐ N/A
4	Landscaping/ Erosion Control Complete Per Plan	☐ YES	☐ NO	☐ N/A
5	Access Road Complete Per Plan	☐ YES	☐ NO	☐ N/A
6	All Trash and Debris Hauled Off Site	☐ YES	☐ NO	☐ N/A
7	Site Area restored to Original Condition	☐ YES	☐ NO	☐ N/A
8	Unistruts, iron angles and Rods properly cold galvanized	☐ YES	☐ NO	☐ N/A
9	RF Safety Signage Installed where Required	☐ YES	☐ NO	☐ N/A
E	**Monopole/Tower Work**			
1	Monopole/Tower Plumb, Torqued and Free of Visible Defects	☐ YES	☐ NO	☐ N/A
2	Orientation of Monopole/Tower Per Plan	☐ YES	☐ NO	☐ N/A
3	Safety Climb Installed and Tensioned per Manufacturer Spec.	☐ YES	☐ NO	☐ N/A
4	Weep Hole Free of Obstructions	☐ YES	☐ NO	☐ N/A
5	Step Bolts Installed/ Removed Below 30 feet	☐ YES	☐ NO	☐ N/A
6	Monopole/Tower Tie-In to Ground Ring Complete	☐ YES	☐ NO	☐ N/A

Navini NETWORKS™

Internet at the speed of thought™

COMPANY _____
SITE NAME _____
SITE NO _____
LOCATION _____
NETWORK ID _____
EMS ID _____

BTS SITE COMPLETION CERTIFICATION (40-00092-00 Rev 1.10)

F Grounding

1	Monopole/Tower Grounding Installed	☐ YES	☐ NO	☐ N/A
2	Ground Wire Types and Size meet construction Specs	☐ YES	☐ NO	☐ N/A
3	Lightning Rod Provided and Installed Per Plan	☐ YES	☐ NO	☐ N/A
4	5 Ohm Megger Ground Resistance Test Complete	☐ YES	☐ NO	☐ N/A
5	Buss Bars Installed Per Plan	☐ YES	☐ NO	☐ N/A
6	Surge Protector Installed Between RFS Antenna and Cable	☐ YES	☐ NO	☐ N/A
7	Coax Ground Kits Installed at RFS Antenna Per Plan	☐ YES	☐ NO	☐ N/A
8	Coax Ground Kits Installed at Tower Base Per Plan	☐ YES	☐ NO	☐ N/A
9	Coax Ground Kits Installed at Buss Bar Prior to BTS Per Plan	☐ YES	☐ NO	☐ N/A
10	Double Lug Connectors Used at All Buss Bar Attachments	☐ YES	☐ NO	☐ N/A
11	Cable Tray/Ice Bridge Bonded and Grounded to Buss Bar	☐ YES	☐ NO	☐ N/A
12	Surge Protectors Mounted and Secured on ground Buss Bar	☐ YES	☐ NO	☐ N/A
13	Master Ground Buss Bar Tied-In to Ground Ring	☐ YES	☐ NO	☐ N/A
14	Equipment Rack Ground Per Plan	☐ YES	☐ NO	☐ N/A
15	Power Supply/UPS, Rectifier Ground Per Plan	☐ YES	☐ NO	☐ N/A
16	Meter and Backhaul Ground Per Plan	☐ YES	☐ NO	☐ N/A
17	Fence Work Grounded Per Plan	☐ YES	☐ NO	☐ N/A
18	Additional Equipment Tied-In to BTS properly Grounded	☐ YES	☐ NO	☐ N/A

G Electrical, Backhaul and Network

1	Power and Backhaul Conduits Installed Per Plan	☐ YES	☐ NO	☐ N/A
2	Conduits Are Labeled and Pull Strings are Provided	☐ YES	☐ NO	☐ N/A
3	Meter is Installed Per Plan	☐ YES	☐ NO	☐ N/A
4	Circuit Breakers Installed and Properly Labeled	☐ YES	☐ NO	☐ N/A
5	UPS Installed and All Internal Connections Made	☐ YES	☐ NO	☐ N/A
6	Rectifier Installed, Output and Wiring to BTS Checked	☐ YES	☐ NO	☐ N/A
7	Network/Telco Tie-In to BTS, Tested and Complete	☐ YES	☐ NO	☐ N/A
8	EMS Installed and Connected to Network	☐ YES	☐ NO	☐ N/A

H BTS System

1	Cabinet is Positioned, Secured and Leveled Per Plan	☐ YES	☐ NO	☐ N/A
2	Cabinet Outer Surfaces Free from scratches, dents, corrosion	☐ YES	☐ NO	☐ N/A
3	BTS Chassis Outer Surfaces Free from scratches and dents	☐ YES	☐ NO	☐ N/A
4	All Hardware Connections within BTS are tightened/secured	☐ YES	☐ NO	☐ N/A
5	RF/GPS Coax Connectors Securely Connected to BTS	☐ YES	☐ NO	☐ N/A
6	Signal/Power Cable Securely Connected to BTS	☐ YES	☐ NO	☐ N/A
7	Network cables Dressed and Secured to BTS	☐ YES	☐ NO	☐ N/A
8	Documents, License are Stored or Posted on BTS	☐ YES	☐ NO	☐ N/A

J Antenna and Feeder System

1	RFS Antenna Height and Orientation Per Plan	☐ YES	☐ NO	☐ N/A
2	RFS Antenna Mount Plumb Per Axis	☐ YES	☐ NO	☐ N/A
3	GPS Antenna Mounted Per Plan	☐ YES	☐ NO	☐ N/A
4	Zinc Cold Galvanizing compound used everywhere	☐ YES	☐ NO	☐ N/A
5	Coaxial Cables Run Straight (Not Exceeding Bend Radius)	☐ YES	☐ NO	☐ N/A
6	Coaxial Cables Tagged and Color Coded Per Plan	☐ YES	☐ NO	☐ N/A
7	Connectors and Jumpers Installed and Weatherproofed	☐ YES	☐ NO	☐ N/A
8	Cable Hangers, Bands or Ties Spaced up every 3 Feet	☐ YES	☐ NO	☐ N/A
9	Antenna Power and Data Cable Continuity Tested	☐ YES	☐ NO	☐ N/A
10	Antenna System Sweep Test Performed and Passed	☐ YES	☐ NO	☐ N/A
11	SW and Hard Copy of Antenna Sweep Test Results Provided	☐ YES	☐ NO	☐ N/A

Navini NETWORKS™

Internet at the speed of thought™

COMPANY _____
SITE NAME _____
SITE NO _____
LOCATION _____
NETWORK ID _____
EMS ID _____

BTS SITE COMPLETION CERTIFICATION (40-00092-00 Rev 1.10)

NOTES

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Printed Name _____
Signature / Date _____
Company _____
Phone No. _____

Printed Name _____
Signature / Date _____
Company _____
Phone No. _____

Printed Name _____
Signature / Date _____
Company _____
Phone No. _____

Appendix S: Location (FTP) Tests

Introduction

The Location, or FTP, Test is performed to check the Ripwave system operation through file transfers between the Base Station and the Modem. The test measures the data rate performance at various locations within the coverage area. Data throughput is measured by executing file transfers using the FTP protocol for both upstream and downstream links. A file server must be in place on the same subnet with the BTS to accurately perform the file transfer, and the Modem. User computer must be loaded with an FTP Client. As the file transfer is running, a data file is captured by the Modem tool. Data rates are captured by the FTP program.

Data is recorded in a spreadsheet format. The spreadsheet lists the location, GPS, and other information. As data rates are captured, the results are entered manually. An average SNR and sync RSSI can be read from the debug tool, and recorded, for quick comparison to the acceptable criteria (see "Acceptable Criteria" section of this appendix). For NLOS indoor locations, tests are performed both outside the building and inside, so that the obstruction loss for the building can be determined. Unless the customer can provide indoor access, all results will be LOS or Near NLOS.

Planning the Locations

Before the actual testing is conducted, you need to select the test locations.

First, select one Line of Sight (LOS) location about 2 km away from the Base Station. The results at this location will be as good as you could expect to get from your system and will constitute your "base line" for future reference.

Second, based on your preliminary RF propagation, select 4 additional locations (LOS or NLOS), if the Base Station has a panel RFS; or 7, if it has an omni RFS.

Criteria of Acceptability

In order to evaluate the test results, several criteria are taken into consideration. These criteria are valid for both LOS and NLOS locations.

- Processed Sync Signal Strength: For a given test location, ± 2 dB variation during FTP
- Absolute Sync Signal Strength – Processed Sync Signal Strength: not greater than 2 dB variation during FTP

- SNR values consistent during the FTP for all carriers used:
  a. QPSK: at least 11 dB
  b. 8 PSK: at least 14 dB
  c. QAM16: at least 17 dB
- UL and DL Packet Error Rates (PER) not greater than 1%. This will vary according to interference levels, but may not render the system inoperable.
- Uplink Beam Forming Gain: between 16 dB and 21 dB. Perform a comparison of UL and DL, Beam Forming Gain differences should be not greater than 3 dB.

- Modem Transmit Power < 25 dBm; BTS Transmit Power < 0 dBm per code channel with power control

- Sync vs. Data Rate:

Absolute Sync (dBm)	UL Data Rate (Mbps)	DL Data Rate (Mbps)
(A) –35 to –55	0.6 to 1.0	1.5 to 2.0
(B) –55 to –70	0.6 to 1.0	1.2 to 2.0
(C) –70 to –85	0.5 to 1.0	1.2 to 2.0
(D) –85 to –95	0.10 to 0.5	0.3 to 1.0
(E) –95 to –105	0.033 to 0.1	0.066 to 0.66

Process

The recommended process for performing the Location (FTP) tests is described below.

First: Verify that a single Modem transmits and receives data at expected rates, as indicated previously.

Second: Verify that multiple Modems simultaneously transmit and receive data at acceptable rates, and the parameters listed above are being met. NOTE: The exact number of Modems is determined by field conditions. The minimum is two.

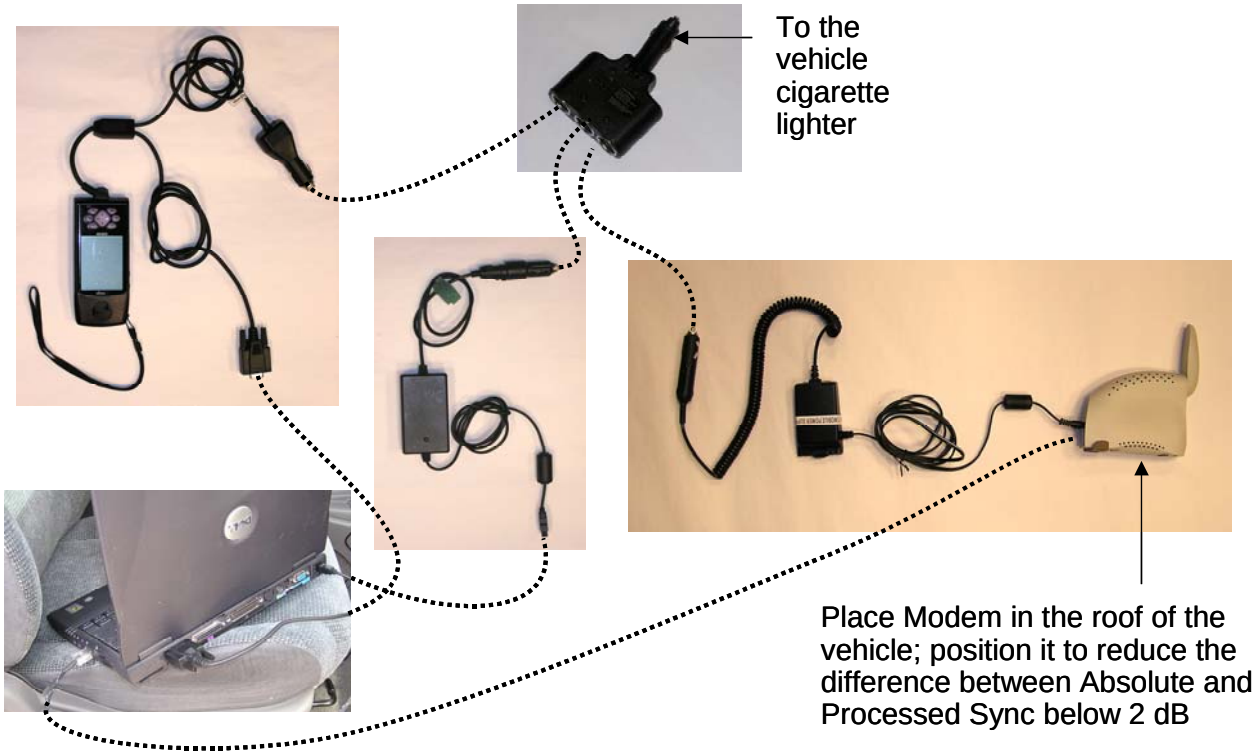
Third: Verify operation at the full range of the system*. Include LOS Location Tests at cell edges. The height of Modem and uplink and downlink data rates are recorded for each site. Data rates are to be compared with expected results, as seen in the last item (Sync vs. Data Rate) of Acceptance Criteria. For example:

*2.6 GHz : ~12 Km
*2.4 GHz: ~ 3 Km

Equipment Required

- Laptop computer
- GPS receiver with serial cable
- Constellation Debugger application
- BTS Beam Form Display diagnostic tool
- Modem
- Modem power supply
- DC to AC power converter
- Ethernet Cable

Equipment Setup



Location (FTP) Test Procedure

Two people are needed to perform this procedure. One will be in the car performing the location test, and the other will be at the Base Station checking the operation using the BTS Beam Form Display diagnostic tool.

1. Ensure that the Base Station has successfully completed calibration, RF sanity measurements, and the Drive Study at the frequency and TX/RX signal levels that were determined by the cell site survey. Also ensure that the Base Station is powered on and is able to transmit and receive data.
2. Connect the DC to AC power converter to the power port in the vehicle.
3. Connect the Modem to the DC to AC power converter.
4. Connect the Ethernet cable to the Ethernet port on the laptop computer and to the Ethernet port on the Modem.
5. Connect the GPS to the serial port on the laptop computer.
6. Drive to one of the locations selected on the RF coverage analysis. Stop and turn off the vehicle.
7. Power on the GPS, the Modem, and the laptop computer. Place the Modem on the roof of the vehicle.
8. Start the Navini Networks FTP/Location Test Tool program.
9. Verify that the Base Station is transmitting and that the Modem establishes sync and can communicate with the Base Station. Ping a device address on the network side of the Base Station, and verify that a reply is received. While monitoring the Constellation Debugger, position the Modem to reduce the difference between absolute sync and processed sync levels to 2 or less.
10. Enter a memo into the comment field about which link of the test is being performed.
11. Verify that the GPS input is seen in the application.
12. Put the location number/site identifier into the comment field of the Navini Networks Constellation Debugger, and press the Enter key. This will identify the site location.
13. On the EMS connected to the Base Station, start the BTS Beam Form Display diagnostic tool.
14. From the laptop computer with the Modem connected to it, start a downlink FTP file transfer. Record the results on the site page or in the log.
15. On the EMS connected to the Base Station, using the BTS Beam Form Display diagnostic tool verify the strength and direction of the beam during the file transfer. Record the results on the site page or in the log.
16. Repeat the file transfer three times, stopping and starting the Debugger and Beam Form Display diagnostic tool for each transfer
17. Repeat steps 14-15, this time performing an uplink FTP transfer.

18. When finished, remove the Modem from the roof and secure equipment for travel.
19. Drive to the next location selected on the RF coverage analysis. Stop, and turn off the vehicle.
20. Repeat steps 7 to 19 until all locations are tested. At this point send this data to the RF Engineers to analyze, or continue until each quadrant in the cell is complete. When you send the results depends upon the schedule or results from the file transfers.

Location (FTP) Test Form

The form for recording the Location (FTP) test results is an Excel spreadsheet. Shown in Table T1, the actual column headers go across the top of the form, but are broken into two sections here for readability.

Table T1: Location (FTP) Test Form

FTP LOCATION TEST FORM

Company:			Antenna Type:			Tested By:							
BTS Name:			Azimuth:		Degrees	Test Date (Start):							
BTS ID:			Up/Down Tilt (M/E):		Degrees	Test Date (End):							
SW Release:			Frequency:		MHz								

Site #	Site Name	GPS Coordinates	Data Capture File Name		Km to BTS	LOS	NLOS	FTP Data Rate (Kbps)		Sync (dB)		Remarks
			Debugger	Beamform (bin)				Down link	Uplink	Absolute	Processed	
1	Sector / Omni											
2	Sector / Omni											
3	Sector / Omni											
4	Sector / Omni											
5	Sector / Omni											
6	Sector / Omni											
7	Sector / Omni											
8	Omni / Optional											

FTP LOCATION TEST FORM

Company: 0
BTS Name: 0
BTS ID: 0
S/W Release: 0
Antenna Type: 0
Azimuth: 0 Degrees
Up/Down Tilt (M/E): 0 Degrees
Frequency: 000 MHz
Tested By:
Test Date (Start):
Test Date (End):

Site #	Site Name	GPS Coordinates	Data Capture File Name		Km to BTS	LOS	NLOS	FTP Data Rate (Kbps)		Sync (dB)		Remarks
			Debugger	Beamform (bfm)				Down link	Uplink	Absolute	Processed	
9 Omni / Optional												
10 Optional / Optional												
11 Optional / Optional												
12 Optional / Optional												
13 Optional / Optional												
14 Optional / Optional												

Appendix V: IC Closeout Tool

Overview

This is a new complex form that replaces the following older forms:

1. RFS System Test Form
2. 2nd tab of the Base Station Installation Certification Form (Serial Numbers)
3. Calibration Verification Form
4. Drive Study Form
5. Location (FTP) Test Form

The I&C Closeout Tool (Part Number xx) consists of the following worksheets (tabs):

1. Company Info
2. BTS Info
3. Serial #
4. Layer 1 & 2
5. Cable Loss
6. Calibration Plot
7. RFS and Cable RFS Loss
8. RF Verification
9. Drive Test Form
10. Location Testing

Before Using the Form

Once a BTS has been added and fully configured in the EMS (including execution the RFS script from the floppy delivered with the antenna, as well as successfully calibrated, you must perform the "Export All BTS Data" action on this BTS. This creates a text-only file that will be used as input for the I&C Closeout Tool.

Using the Form

Open the IC_Form and select the first tab (Company Info) and click on the "Read BTS Export File (*.txt)" button. This action will read the configuration data contained in the BTS export file and populate most of the fields in all the tabs of the I&C Closeout Tool. Complete tabs 1

(Company Info), 2 (BTS Info), 3 (Serial #), and 5 (Cable Loss) by filling the green fields manually. No data needs to be entered manually in tabs 4 (Layer 1 & 2) and 6 (Calibration Plot). The remaining four tabs, 7 (RFS and Cable RFS Loss), 8 (RF Verification), 9 (Drive Test Form), and 10 (Location Testing) will be filled as part of the corresponding procedures.

Click on the "Save Workbook" button on the Company Info worksheet (first tab) before saving this Excel file. The purpose of this action is… (ASK PHIL ABOUT THIS AND ABOUT THE CREATE AUDIT REPORT BUTTON).

Figure V1: Company Info (1st tab)

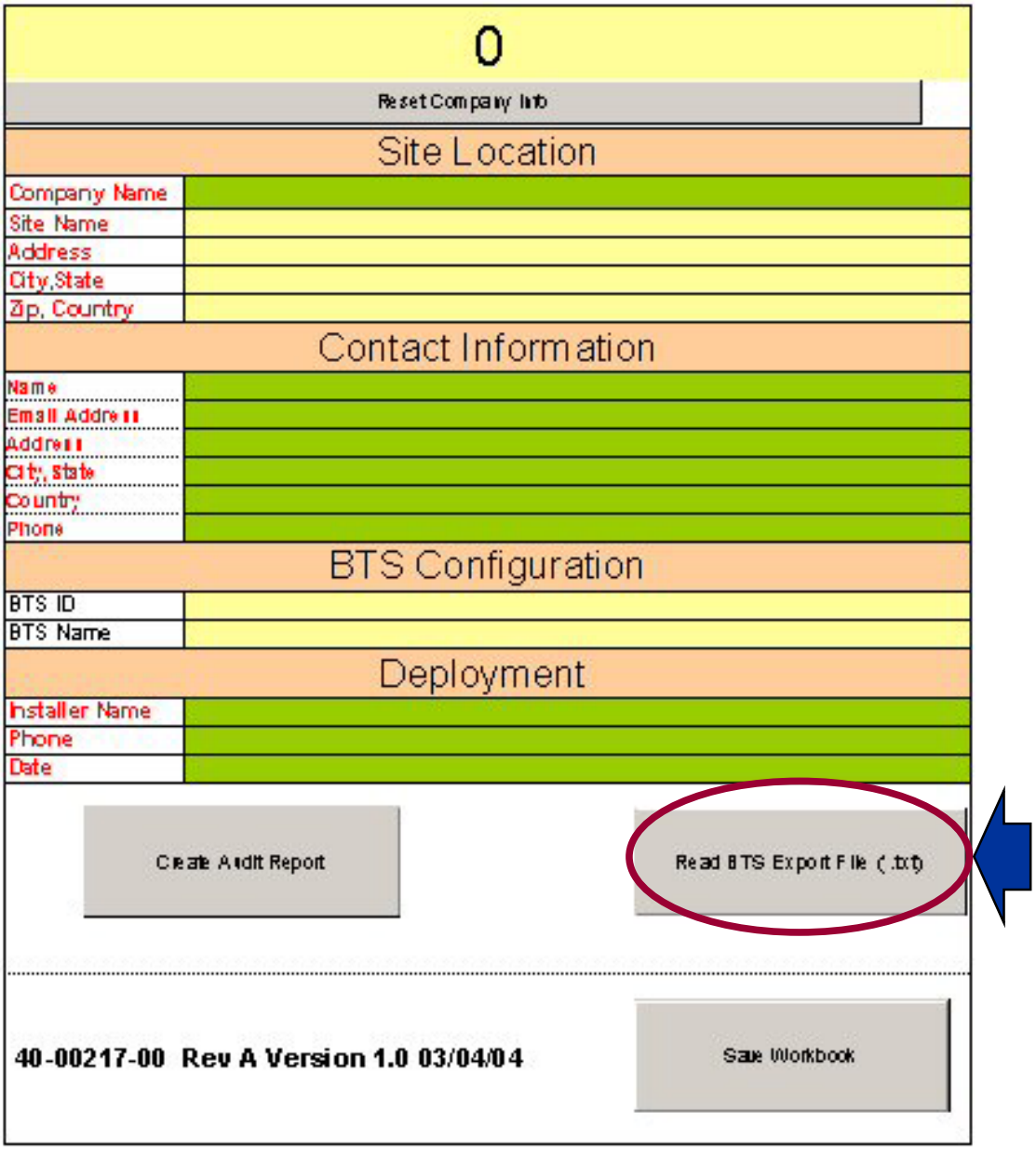


Figure V2: BTS Info (2nd tab)

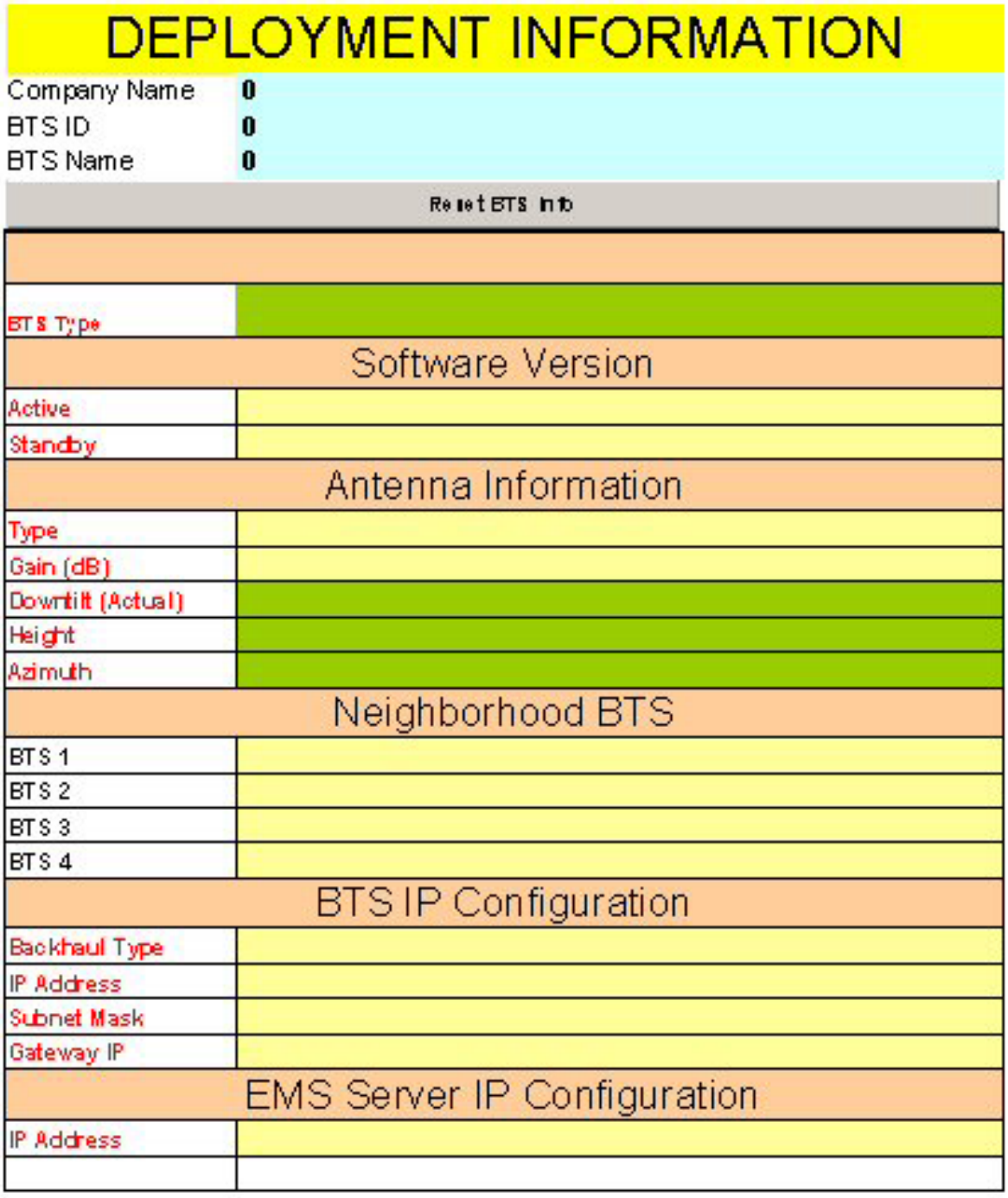


Figure V3: Serial # (3rd tab)

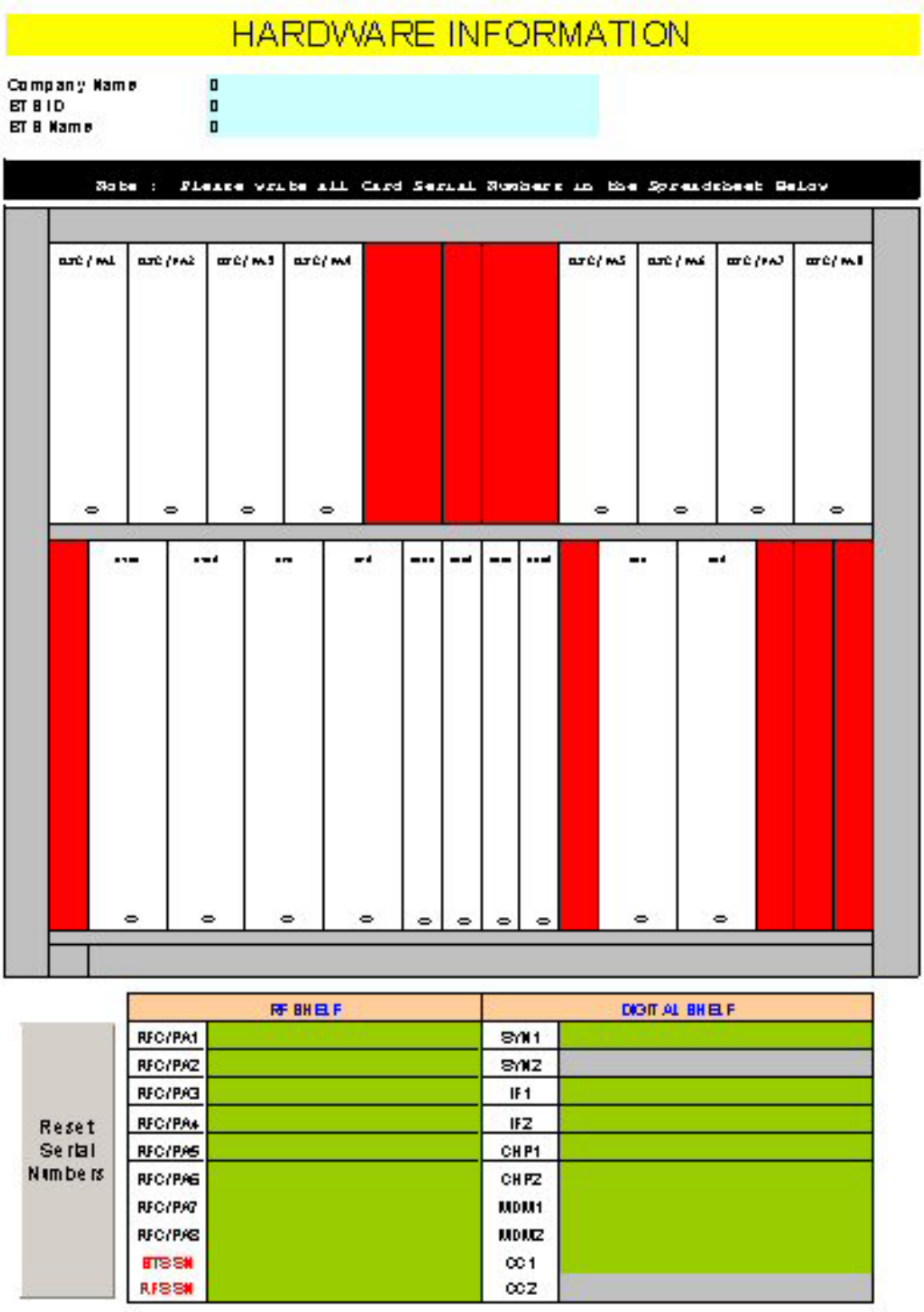


Figure V4: Layer 1 & 2 (4th tab)

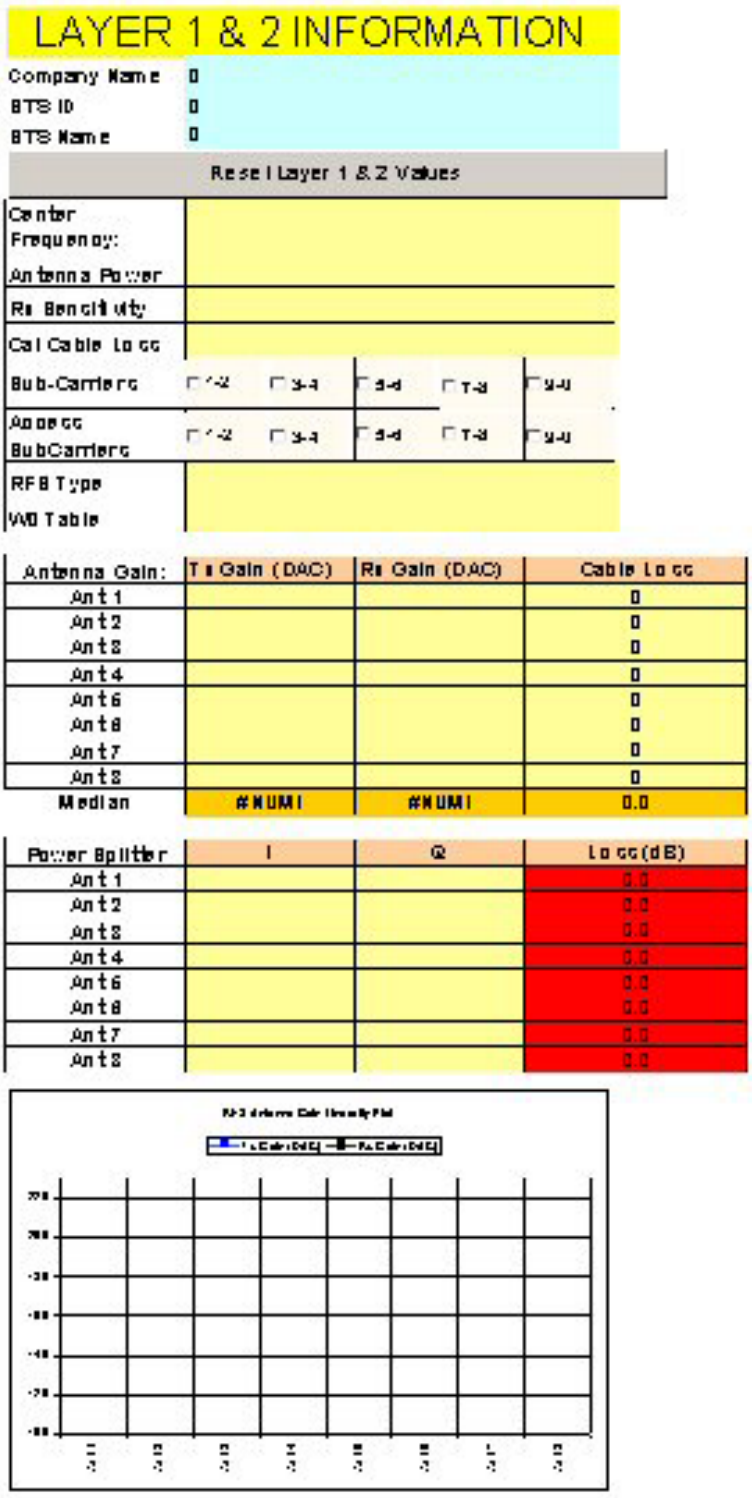
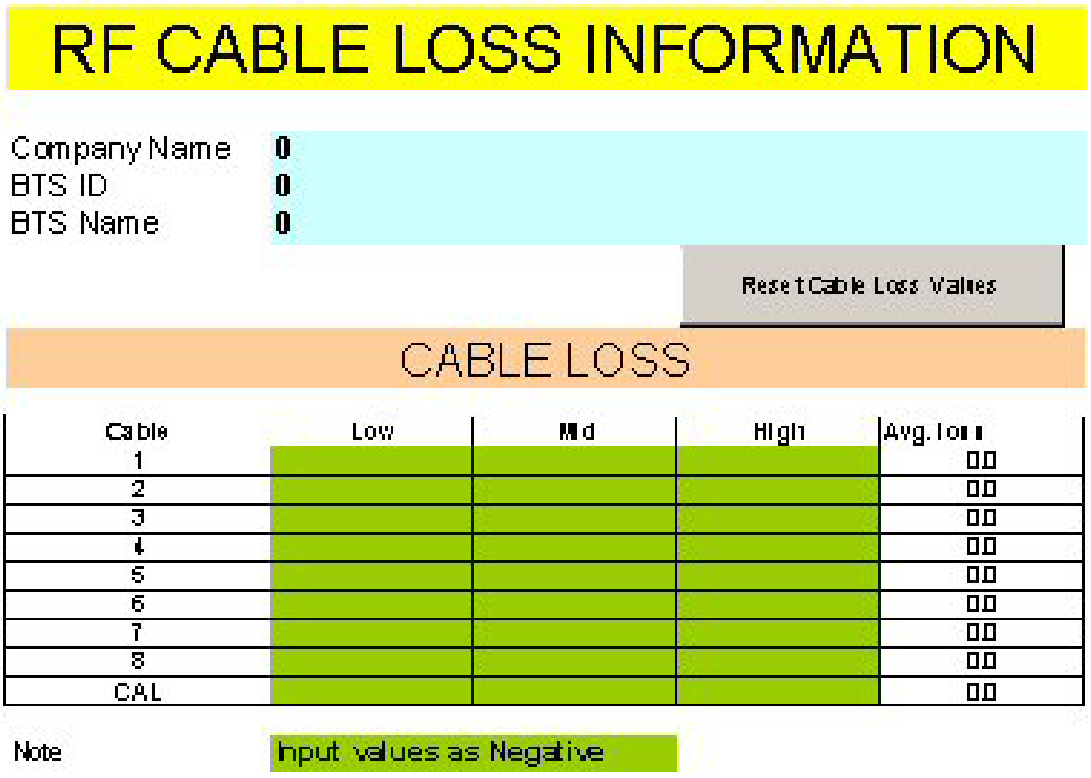


Figure V5: Cable Loss (5th tab)



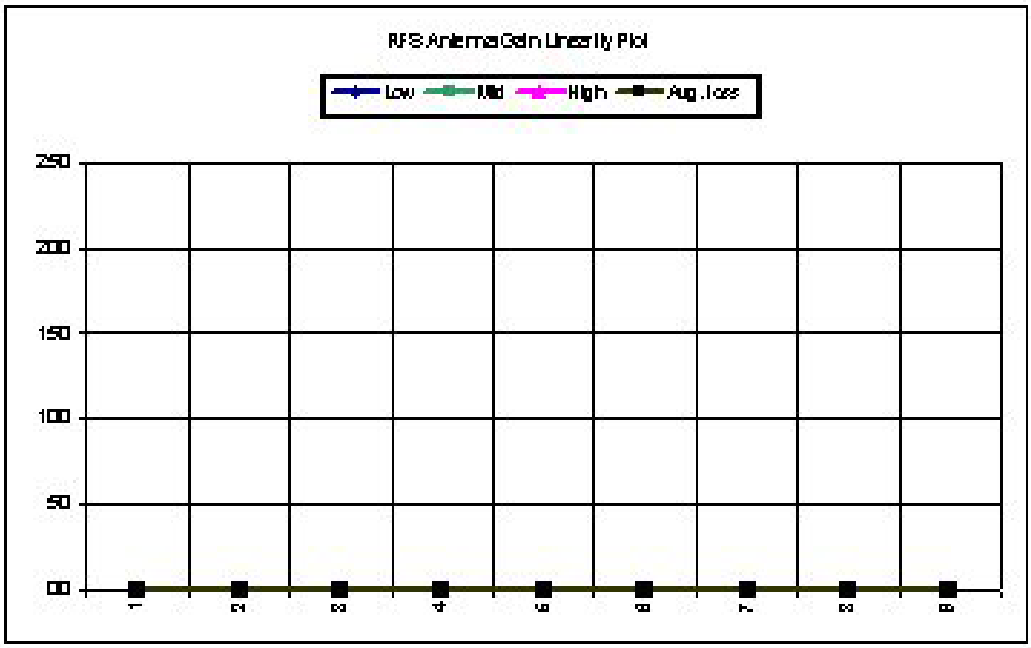


Figure V6a: Calibration Plot (6th tab) – Part One of Three

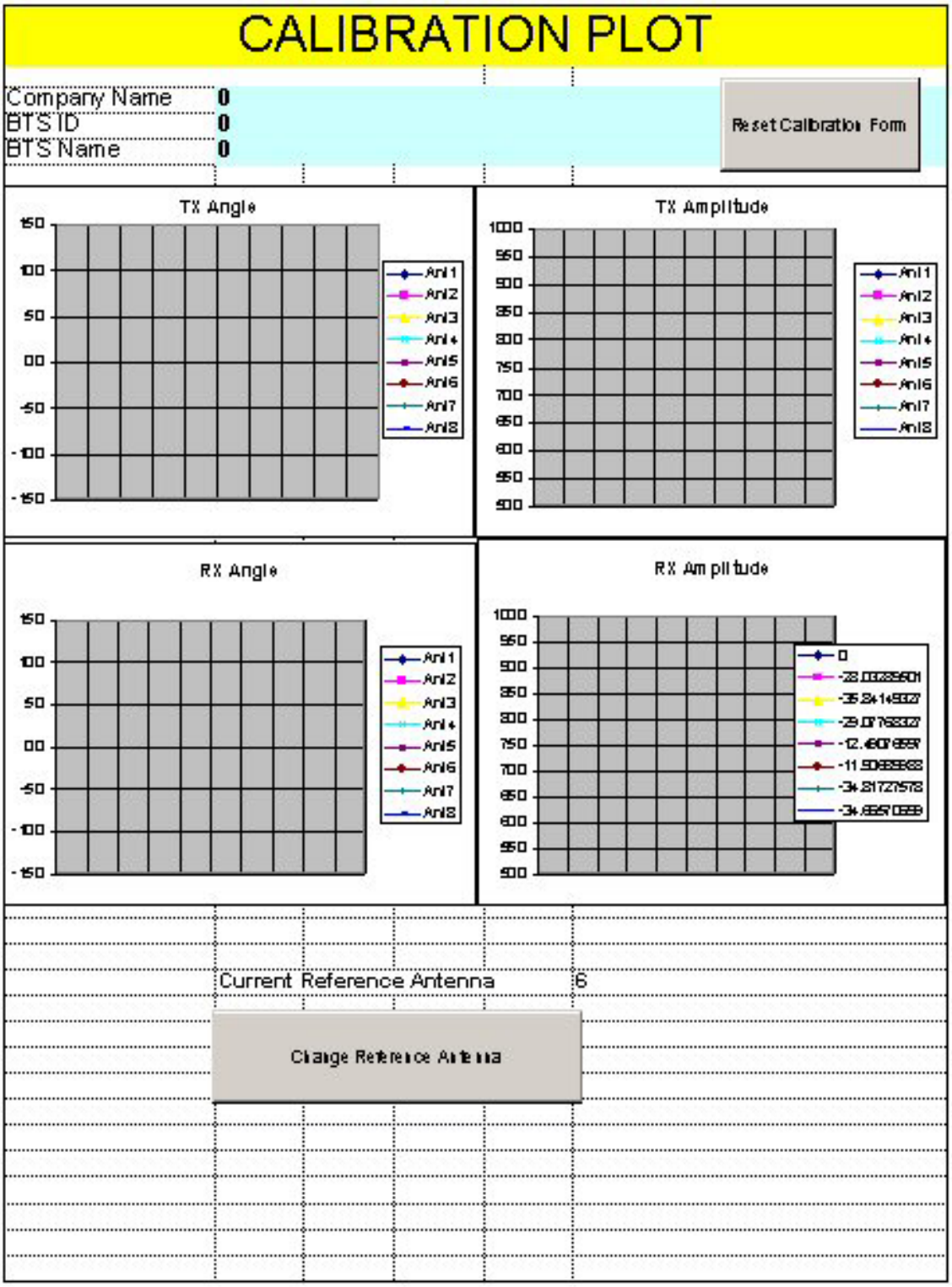


Figure V6b: Calibration Plot (6th tab) – Part Two of Three

TX Angle

	Ant 1	Ant 2	Ant 3	Ant 4	Ant 5	Ant 6	Ant 7	Ant 8
Carrier 1								
Carrier 2								
Carrier 3								
Carrier 4								
Carrier 5								
Carrier 6								
Carrier 7								
Carrier 8								
Carrier 9								
Carrier 10								

TX Amplitude

	Ant 1	Ant 2	Ant 3	Ant 4	Ant 5	Ant 6	Ant 7	Ant 8
Carrier 1								
Carrier 2								
Carrier 3								
Carrier 4								
Carrier 5								
Carrier 6								
Carrier 7								
Carrier 8								
Carrier 9								
Carrier 10								

RX Angle

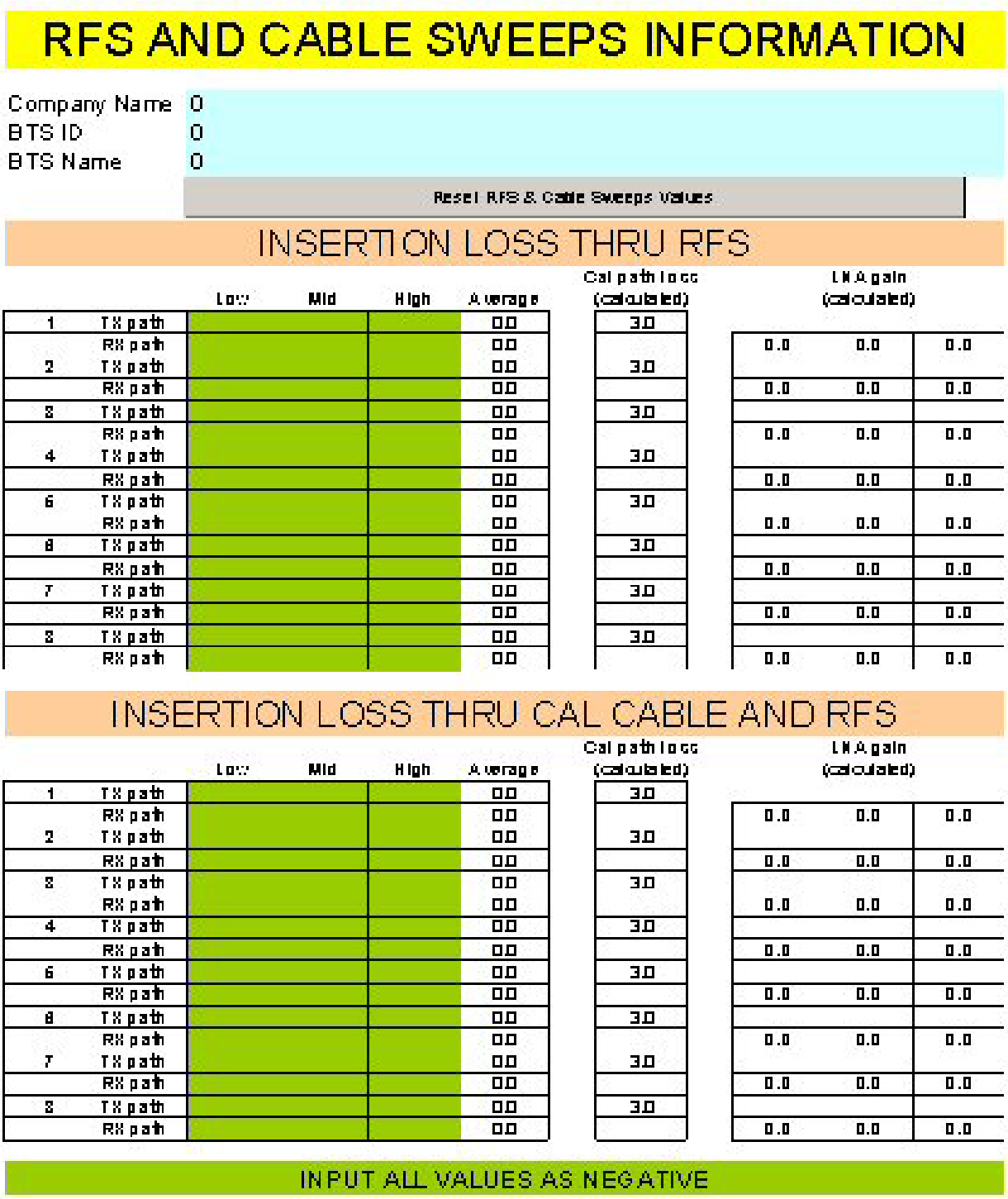
	Ant 1	Ant 2	Ant 3	Ant 4	Ant 5	Ant 6	Ant 7	Ant 8
Carrier 1								
Carrier 2								
Carrier 3								
Carrier 4								
Carrier 5								
Carrier 6								
Carrier 7								
Carrier 8								
Carrier 9								
Carrier 10								

RX Amplitude

	0	-28.0329	-35.8415	-29.0777	-12.4908	-11.9069	-34.8173	-34.6657
Carrier 1								
Carrier 2								
Carrier 3								
Carrier 4								
Carrier 5								
Carrier 6								
Carrier 7								
Carrier 8								
Carrier 9								
Carrier 10								

Figure V6c: Calibration Plot (6th tab) – Part Three of Three

Figure V7: RFS & Cable RFS Loss (7th tab)



RFS AND CABLE SWEEPS INFORMATION

Company Name 0
BTS ID 0
BTS Name 0

Reset RFS & Cable Sweeps Values

INSERTION LOSS THRU RFS

		Low	Mid	High	Average	Cal path loss (calculated)	LNA gain (calculated)		
1	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
2	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
3	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
4	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
5	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
6	TX path				0.0				
	RX path				0.0		0.0	0.0	0.0
7	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
8	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0

INSERTION LOSS THRU CAL CABLE AND RFS

		Low	Mid	High	Average	Cal path loss (calculated)	LNA gain (calculated)		
1	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
2	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
3	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
4	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
5	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
6	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
7	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0
8	TX path				0.0	3.0			
	RX path				0.0		0.0	0.0	0.0

INPUT ALL VALUES AS NEGATIVE

Figure V8: RF Verification (8th tab)

RF VERIFICATION FORM

Reset RF Verification

Date	
Company Name	0
BTS Name	0
BTS ID	0
Frequency (MHz)	0.00
Software release	
Personnel	0.00
Cal cable loss (-)	
Attenuation (-)	
Total Path loss (-)	0.0
RX sensitivity (set in EMS) (-)	
Antenna power (in EMS)	
Antenna gain	0.0
Sync scale	
Modem correction factor	
Modem EID	
Sync correction	0.0

	Cable Loss			
	Low	Mid	High	Avg. loss
1	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0
CAL	0.0	0.0	0.0	0.0

Receiver Performance

Power Splitter Loss		UL Tcc Power (-)	UL SNR	Absolute Signal Strength	Noise Level	Noise Figure	RX Gain (DAC word)
I	Q						
				-16.05	-16.05	115.95	
				-16.05	-16.05	115.95	
				-16.05	-16.05	115.95	
				-16.05	-16.05	115.95	
				-16.05	-16.05	115.95	
				-16.05	-16.05	115.95	
				-16.05	-16.05	115.95	
				-16.05	-16.05	115.95	

Transmitter Performance

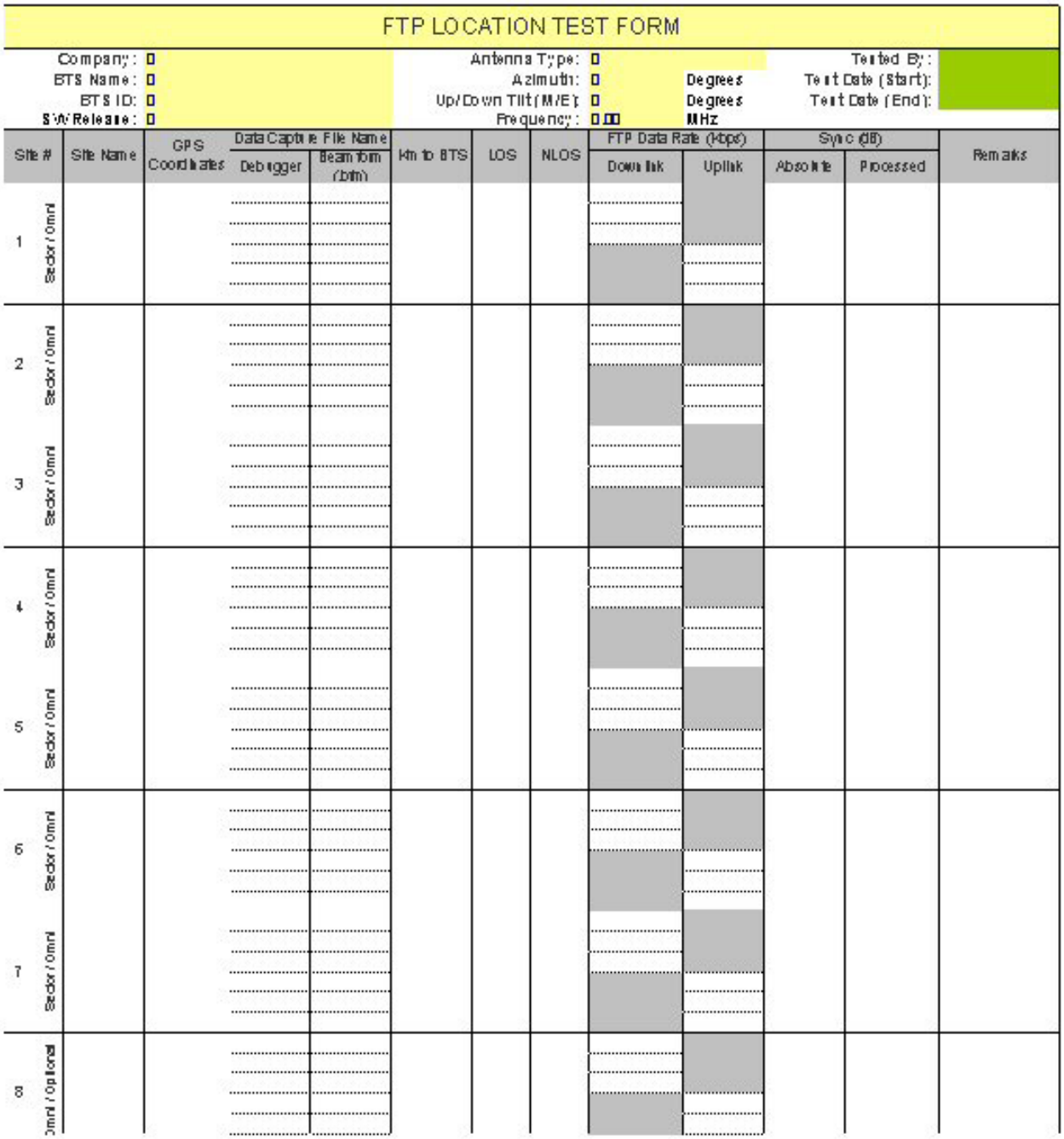
Absolute Sync Level (-)	Corrected	Power at Antenna (RMS)	Delta from Target	Tranceiver Power (RMS)	Tranceiver Power (peak)	Radiated Power (RMS)	TX Gain (DAC word)
	0.0	0.0	0.00	0.0	9.5	0.0	
	0.0	0.0	0.00	0.0	9.5	0.0	
	0.0	0.0	0.00	0.0	9.5	0.0	
	0.0	0.0	0.00	0.0	9.5	0.0	
	0.0	0.0	0.00	0.0	9.5	0.0	
	0.0	0.0	0.00	0.0	9.5	0.0	
	0.0	0.0	0.00	0.0	9.5	0.0	
	0.0	0.0	0.00	0.0	9.5	0.0	
Power deviation		0.0		0.0		0.0	

Figure V9: Drive Test Form (9th tab)

DRIVE TEST FORM		
DRIVE TEST INFORMATION		
Drive test area name	0	
Date of Drive Test		
Drive Tester Name	0	
Standard Vehicle Name and Type		
CPE EID		
CPE Test device Antenna gain (calibrated)		
Drive Route (Map attached)		
Drive test file name		
SITE CONFIGURATION		
Site Coordinates		
Frequency (MHz)	0.00	
BTS Transmit Power	0	
BTS ID	0	
BTS antenna Omni/Panel	0	
Antenna Azimuth (Orientation)	0	
Antenna downtilt (Degrees)	0	
BTS antenna height	0	
DRIVE TEST ROUTE PLAN	YES / NO	TYPICAL CLUTTER HEIGHT
High Density Urban Covered	☐ YES ☐ NO ☐ N/A	
Commercial/Industrial	☐ YES ☐ NO ☐ N/A	
Residential with Trees	☐ YES ☐ NO ☐ N/A	
Residential with Few Trees	☐ YES ☐ NO ☐ N/A	
Paved Areas	☐ YES ☐ NO ☐ N/A	
Grass/Agriculture	☐ YES ☐ NO ☐ N/A	
Open Area	☐ YES ☐ NO ☐ N/A	
Forested Areas	☐ YES ☐ NO ☐ N/A	
Water	☐ YES ☐ NO ☐ N/A	
Airports	☐ YES ☐ NO ☐ N/A	
Others	☐ YES ☐ NO ☐ N/A	

Things to pay attention to:
1. Make sure that the GPS data on the constellation debugger is updating all the time during the drive test.
2. Make sure that the Drive Test CPE only selects the upright antenna all the time.
3. Make sure that the CPE is locked to the correct BTS by checking the BTS ID and frequency.
4. Make sure that the RF connections are good all the time. Check this by observing the stability of the RF signal strength in a LOS location
5. Please make proper log information in certain important locations.

Figure V10a: Location Testing (10th tab) – Part One of Two

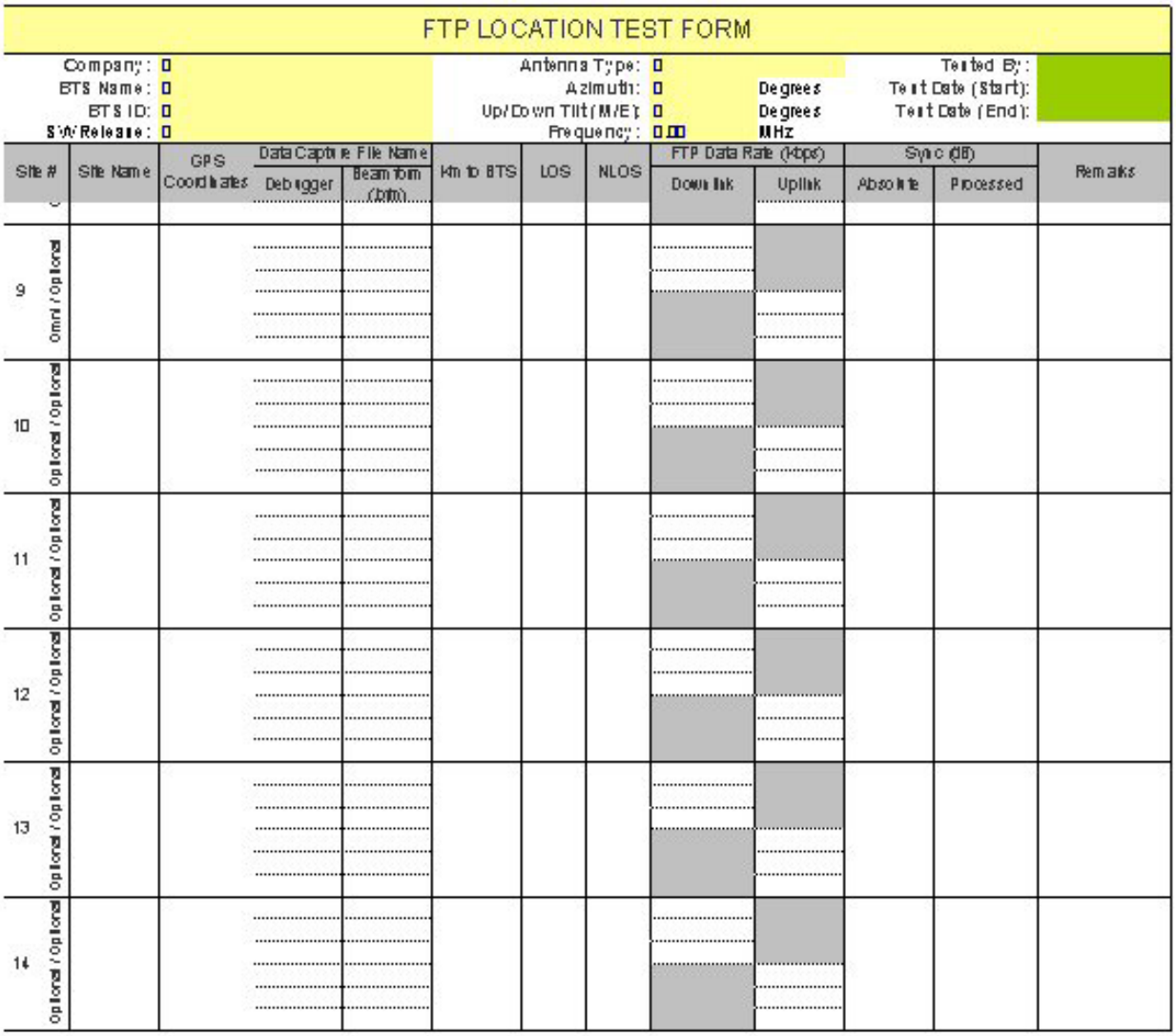


FTP LOCATION TEST FORM

Company:		Antenna Type:		Tested By:	
BTS Name:		Azimuth:	Degrees	Test Date (Start):	
BTS ID:		Up/Down Tilt (M/E):	Degrees	Test Date (End):	
S/W Release:		Frequency:	MHz		

Site #	Site Name	GPS Coordinates	Data Capture File Name		Km to BTS	LOS	NLOS	FTP Data Rate (Kbps)		Sync (dB)		Remarks
			Debugger	Beamform (.bin)				Downlink	Uplink	Absolute	Processed	
1	Sector / Omni											
2	Sector / Omni											
3	Sector / Omni											
4	Sector / Omni											
5	Sector / Omni											
6	Sector / Omni											
7	Sector / Omni											
8	Omni / Optional											

Figure V10b: Location Testing (10th tab) – Part Two of Two



FTP LOCATION TEST FORM

Company:			Antenna Type:			Tested By:						
BTS Name:			Azimuth:		Degrees	Test Date (Start):						
BTS ID:			Up/Down Tilt (M/E):		Degrees	Test Date (End):						
SW Release:			Frequency:		MHz							

Site #	Site Name	GPS Coordinates	Data Capture File Name		Km to BTS	LOS	NLOS	FTP Data Rate (kbps)		Sync (dB)		Remarks
			Debugger	Beamform (bin)				Downlink	Uplink	Absolute	Processed	
9	Omni / Optional											
10	Optional / Optional											
11	Optional / Optional											
12	Optional / Optional											
13	Optional / Optional											
14	Optional / Optional											