

	<u>Version</u>	<u>Date</u>	<u>Page</u>
	1.1	January 28th, 2019	1 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>
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GST-IC-ELITE-TNR

(outdoor)

USER MANUAL

GS Teletech Inc.

	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 2 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

[CHANGE RECORD]

DATE	NAMES	DESCRIPTIONS	VERSION	REMARK
January 10th, 2019	Y.J.KIM	Original Draft	1.0	
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<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	3 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

[TABLE OF CONTENTS]

CHAPTER's INDEX

1. GENERAL	7
1.1. Purpose	7
1.2. Copyright.....	7
2. INTRODUCTION	8
2.1. System Overview.....	8
2.2. Main Features.....	9
3. SYSTEM DESIGN	10
3.1. Perspective View.....	10
3.2. Exterior View	11
3.3. Interior View (Outdoor).....	12
3.4. External Interface (Indoor & Outdoor).....	13
4. SYSTEM SPECIFICATION.....	14
4.1. RF Performance.....	14
4.2. ICS General Performance.....	15
4.3. CH Capacity Information.....	15
4.3.1. LTE Band 41	15
4.3.2. NR Band N41	16
4.5. Configuration & Mechanical Specification.....	17
5. SYSTEM BLOCK CONFIGURATION	18
5.1. RF Signal Flow (Outdoor)	18
5.2. Data Signal Flow	19
5.3. Power Supply Flow	20

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	4 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

6. STATUS/ CONTROL & ALARM MONITORING	21
6.1. Status Monitoring and Control Parameters.....	21
6.2. Alarm Monitoring.....	22
7. WEB-UI OVERVIEW	24
7.1. Configuration the Laptop to Connect to the Repeater	24
7.2. Login-In Screen.....	25
7.3. RF Status & Control.....	26
7.4. Alarm Configuration	27
7.5. Communication Configuration.....	28
7.6. User Management.....	29
7.7. Alarm Log.....	30
7.8. Log	31
7.9. Troubleshooting	32
7.10. Software Update.....	33
7.11. System Reset	34
7.12. Factory Default Setting.....	35
7.13. Configuration Transfer.....	36
8. SYSTEM INSTALLATION.....	37
8.1. Warnings and Hazards	38
8.1.1. Electric Shock.....	38
8.1.2. Exposure to RF	38
8.2. Cabling	39
8.3. Installation Guide for Crew	41
8.3.1. Wall Mount Installation.....	41
8.4. Cable Connection.....	44
8.4.1. AC Power cable connection	44
8.4.2. FAN Power Cable Connection (OPTION)	44
8.4.3. RET Cable Connection (Option)	45
8.4.4. Local Maintenance Connection	45

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	5 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

8.4.5. Grounding cable Connection 46

9. FCC WARNING STATEMENT 47

FIGURE's INDEX

Figure 1. GST-IC-ELITE-TNR Application Configurations	8
Figure 2. GST-IC-ELITE-TNR Perspective View	10
Figure 3. GST-IC-ELITE-TNR Exterior View	11
Figure 5. GST-IC-ELITE-TNR Interior View(Outdoor)	12
Figure 6. GST-IC-ELITE-TNR External Interface	13
Figure 8. GST-IC-ELITE-TNR RF Signal Flow (Outdoor).....	18
Figure 9. GST-IC-ELITE-TNR Signal and Data Flow	19
Figure 10. GST-IC-ELITE-TNR Power Supply Flow	20
Figure 19. Laptop Configuration for connecting the Web-UI.....	24
Figure 20. The way to Log-in on the Web Browser Screen	25
Figure 21. RF Status monitoring & Control.....	26
Figure 22. System Alarm Configurations	27
Figure 23. System Information for connecting configurations	28
Figure 24. System Information about User Management.....	29
Figure 25. The way to check System Alarm Log	30
Figure 26. The way to read a Log History	31
Figure 27. The information of Contact point in case of occurring Field Troubleshooting	32
Figure 28. The way to reload new software using the Web-UI.....	33
Figure 29. The way to reset the system using the Web-UI	34
Figure 30. The way to restore Factory Default Setting for repeater	35
Figure 31. The way to down/ up load configuration between laptop and repeater	36
Figure 37. GST-IC-ELITE-TNR-Outdoor Cabling Diagram	39
Figure 31. Mounting Bracket Shape	41
Figure 44. Fixing the Bracket for installing a Wall Mount	42
Figure 45. The way to hang the system for Wall Mounting	43
Figure 46. The way to fix firmly the System for Wall Mounting.....	43
Figure 49. RJ-45 Interface for connecting the Local Maintenance	45
Figure 50. The way to install the Frame Ground Cable and Lug specifications.....	46

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	6 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

TABLE's INDEX

Table 2. GST-IC-ELITE-TNR Unit Configuration	12
Table 3. GST-IC-ELITE-TNR External Interface Description	13
Table 4. GST-IC-ELITE-TNR RF Performance Description.....	14
Table 5. GST-IC-ELITE-TNR ICS General Performance	15
Table 6. GST-IC-ELITE-TNR Operation Band for LTE Band 41	16
Table 7. GST-IC-ELITE-TNR Operation Band for NR Band N41	16
Table 8. GST-IC-ELITE-TNR Mechanical & Environment conditions.....	17
Table 10. GST-IC-ELITE-TNR RF Signal Flow (Outdoor)	18
Table 11. GST-IC-ELITE-TNR Data Signal Flow	19
Table 12. GST-IC-ELITE-TNR Power Supply Flow.....	20
Table 13. GST-IC-ELITE-TNR Status Monitoring and Control Parameters	22
Table 14. Monitoring Alarm Parameters	23
Table 13. GST-IC-ELITE-TNR Installation Accessories.....	37
Table 13. GST-IC-ELITE-TNR-Outdoor Connecting Cable.....	39
Table 14. AC Power Connector Configuration.....	44
Table 15. GST-IC-ELIT TNR FAN Power Cable Connection.....	44
Table 16. GST-IC-ELIT TNR RET Cable Connection	45

	<u>Version</u>	<u>Date</u>	<u>Page</u>
	1.1	January 28th, 2019	7 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>
USER MANUAL			

1. General

1.1. Purpose

This document introduces features, specifications, structures and operation guideline for the GST-IC-ELITE-TNR LTE & NR

1.2. Copyright

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<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	8 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

2. Introduction

2.1. System Overview

GST-IC-ELITE-TNR is designed to improve coverage and capacity of LTE Band 41 and NR Band N41 services in all shadowed and blanketed areas of Sprint network.

GST-IC-ELITE-TNR receives and improves weak signals as cancelling the multi-path interference even if there is a lack of isolation between Donor and Service antenna.

This solution does not request any costs for Backhaul installation, so will save OPEX and CAPEX.

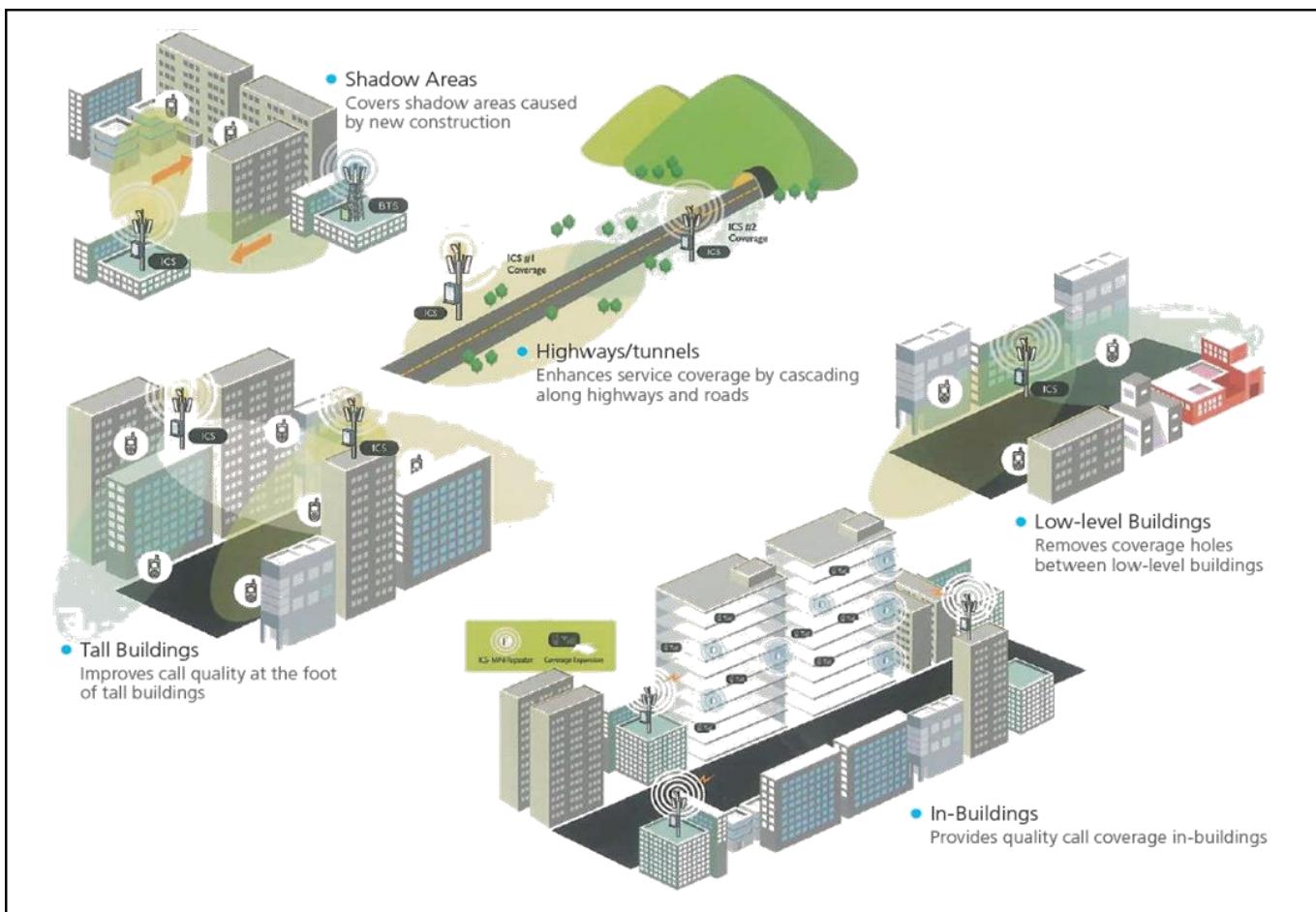


Figure 1. GST-IC-ELITE-TNR Application Configurations

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	9 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

2.2. Main Features

- Maintain the Quality of Demodulation performance on the Overlay-Cell Region using Delay-Reduction Technology (Less than 4us for LTE & 2.41us for NR)
- Provide the SNMP Solution
- Ensure the Uplink-Sensitivity and Suppress Rising-UL noise floor under high out-power at Downlink using PIMD-Reduction Technology
- Excellent RF Specifications
 - High Gain: more than 95dB
 - Low Noise figure under all system gain condition: Less than 5dB
 - Grate Performance of Interference Cancellation: $G=I+10\text{dB}$
 - High Rejection: More than -50dBc at Band Edge $\pm 1\text{MHz}$ for LTE BAND
More than 30dBc at Band Edge $\pm 1\text{MHz}$ For NR BAND
More than 50dBc at Band Edge $\pm 1.5\text{MHz}$ for NR BAND
- Adaptable functions for Operation
 - RS (Pilot) Aware, Smart ALC & ASD, Attenuator for each Band
 - Maximum 60MHz (20MHz *3carrier) for LTE and 60MHz for NR
- Complies with NEMA 4 (equal to IP66) for indoor & Outdoor application
- Apply for Cascade 6 chain installation

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	10 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

3. System Design

3.1. Perspective View

Fan may be used as an option if A is installed in an enclosed space.

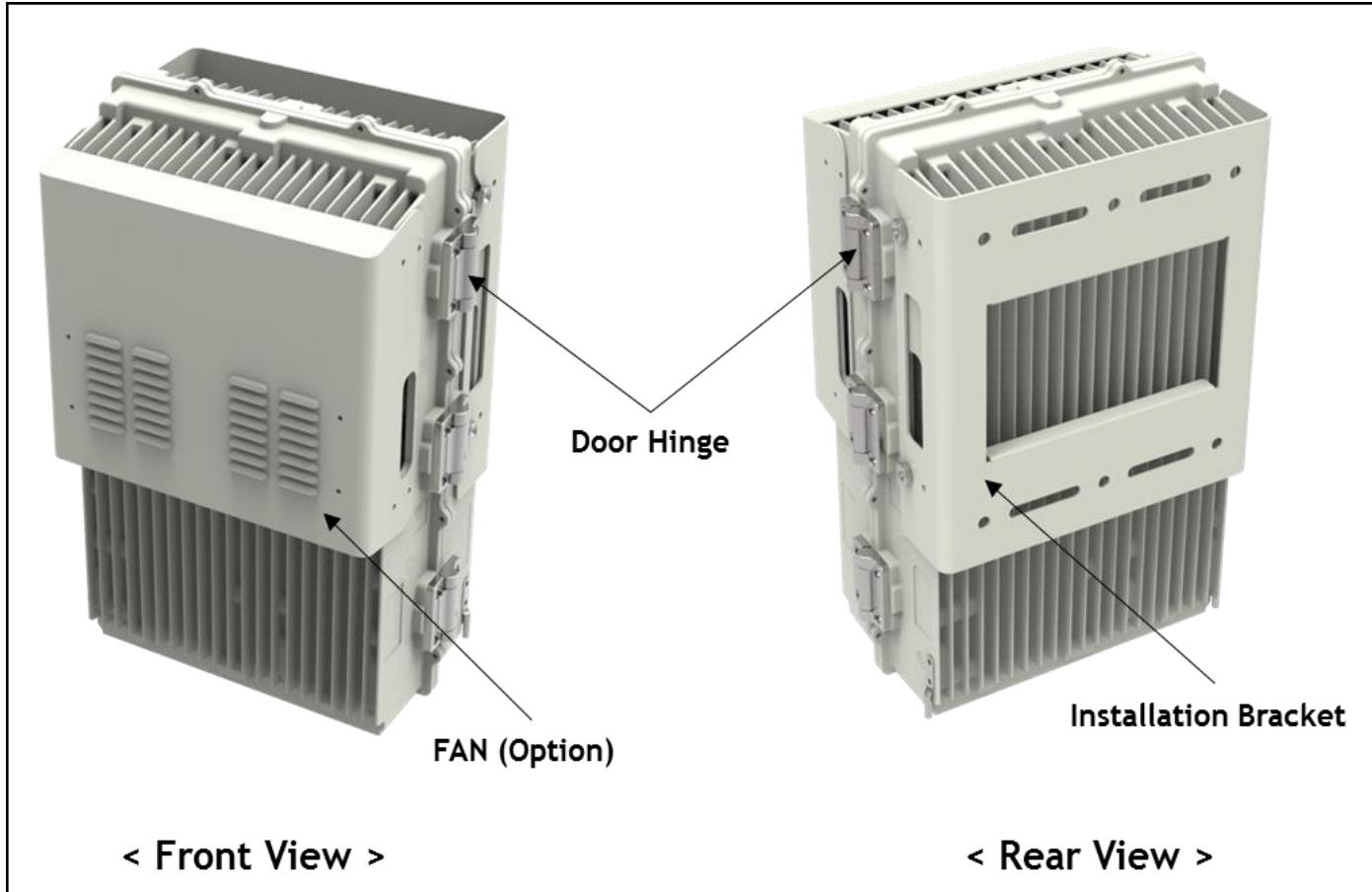


Figure 2. GST-IC-ELITE-TNR Perspective View

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	11 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

3.2. Exterior View

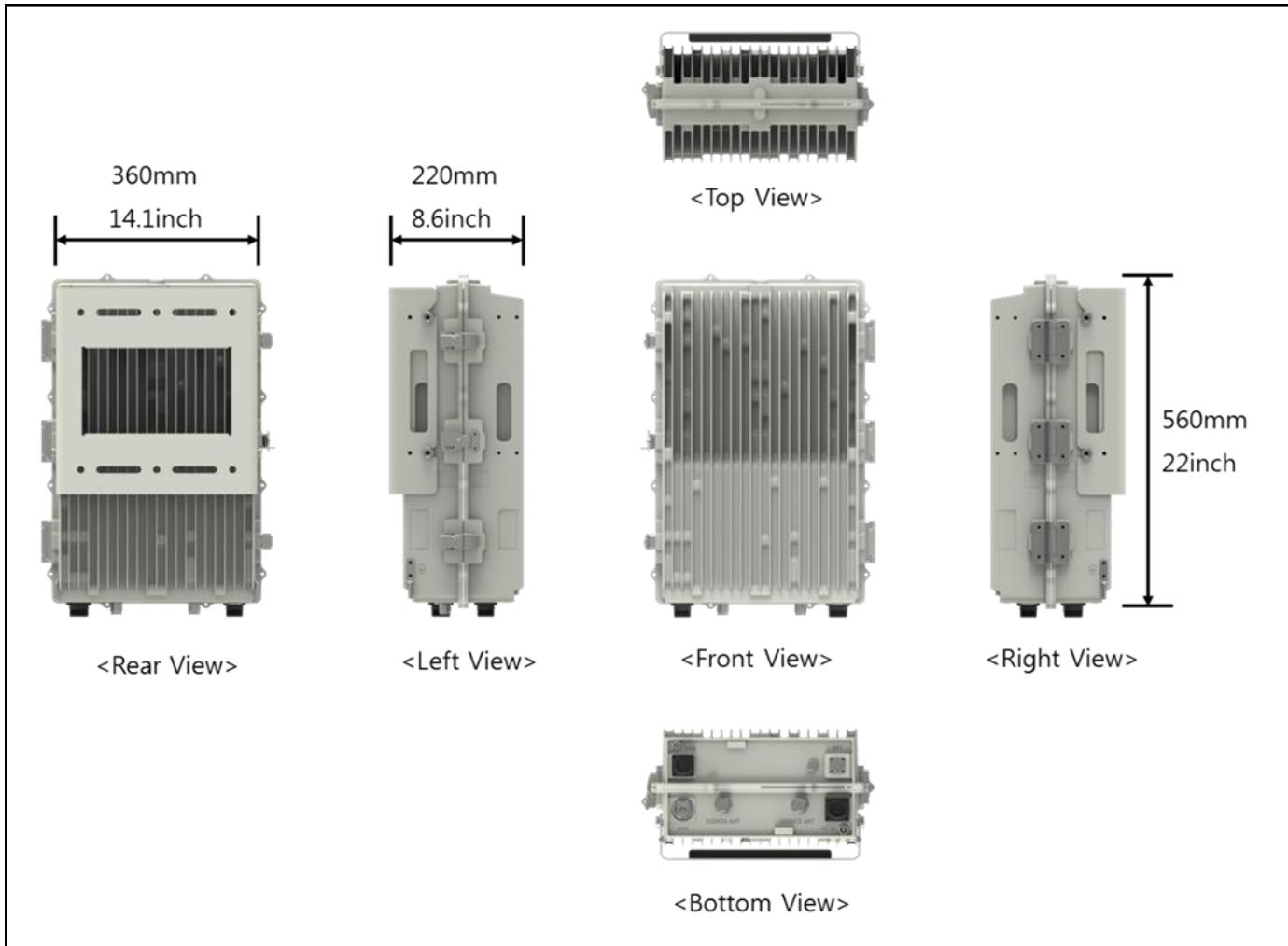


Figure 3. GST-IC-ELITE-TNR Exterior View

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	12 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

3.3. Interior View (Outdoor)

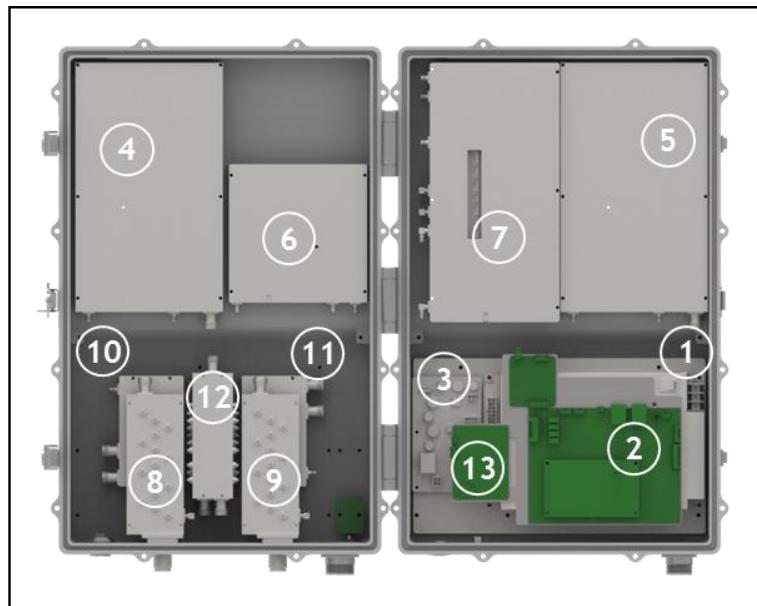


Figure 4. GST-IC-ELITE-TNR Interior View(Outdoor)

No	Name	Remark
1	Power Supply Unit	Input: 110Vac~240Vac/ Output (DC):+29V, +6V
2	SNMP Board	For EMS using Wireless Modem
3	Surge Protect Board	RET Surge Protection
4	Power Amplifier for LTE	For generating Downlink High RF Power
5	Power Amplifier for NR	For generating Downlink High RF Power
6	Power Amplifier for LTE & NR	For generating Uplink High RF Power
7	DFM (Digital Filter Module)	Contains RF Up & Down Convertor, Digital Signal Processing and Controller Unit
8	Band Pass Filter for Donor	Filtering for Band41 for Donor interface
9	Band Pass Filter for Service	Filtering for Band41 for Service interface
10	Donor Switching Module	Separate downlink & uplink for Donor
11	Service Switching Module	Separate downlink & uplink for Service
12	Combiner	Downlink power combiner for LTE & NR
13	EMS Modem	For Status Monitoring and Control from Server

Table 1. GST-IC-ELITE-TNR Unit Configuration

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	13 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

3.4. External Interface (Indoor & Outdoor)

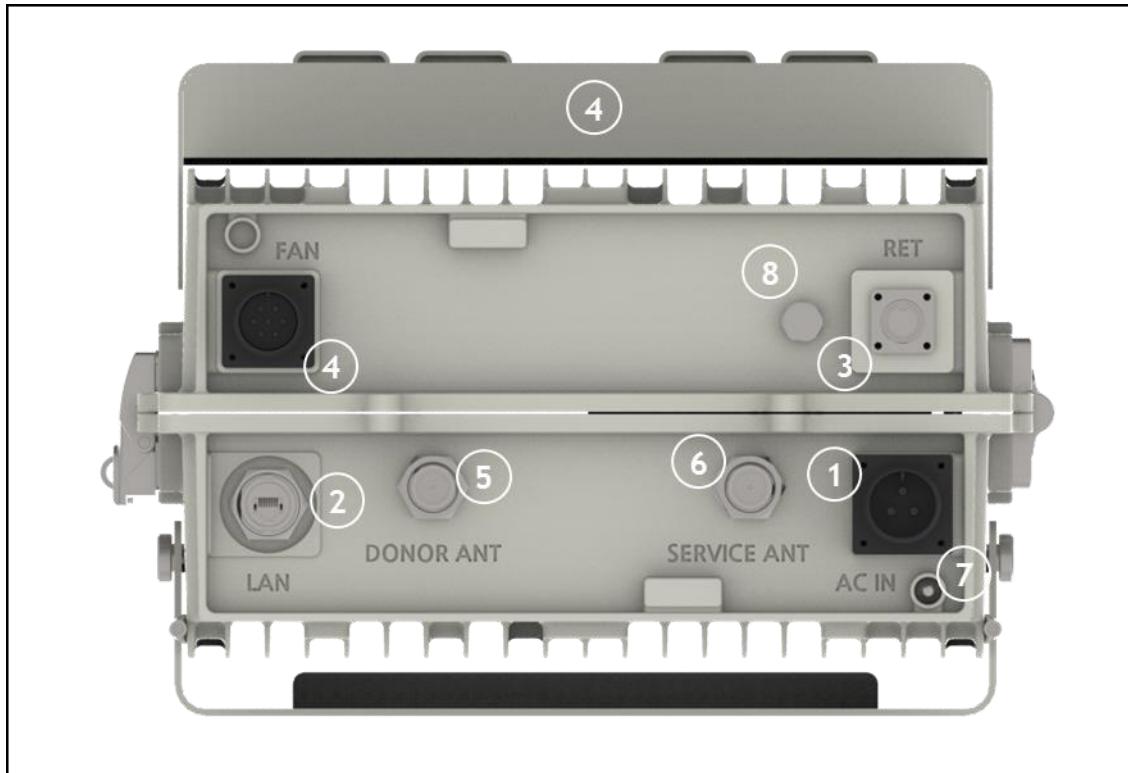


Figure 5. GST-IC-ELITE-TNR External Interface

No	NAMES	DESCRIPTION	SPECIFICATION
1	AC IN	AC Power Input Port	MS22-2-3P
2	RJ-45	Local Maintenance or communication other equipment of GST	Local: RJ-45
3	RET	Remote Antenna Control Port (AISG 2.0)	SU20SPR-8S/ 29V_1.5A max
4	FAN	FAN Power & Alarm Connection	MS20-15-7P
5	Donor ANT	Donor Antenna Connection	4.3-10 Mini- DIN Female
6	Service ANT	Service Antenna Connection	4.3-10 Mini- DIN Female
7	LED	System Total Alarm Indication	General Performance
8	Vent-Core	Maintain Humidity & Temp Inside	IP66

Table 2. GST-IC-ELITE-TNR External Interface Description

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	14 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		<u>Approved by</u>

4. System Specification

4.1. RF Performance

Parameter	Downlink		Uplink	Remark	
Frequency Range	2496.3 ~ 2690MHz @ 100KHz Step		-65dBm ~ -35dBm/Service	LTE	
	2496.3 ~ 2690MHz @ 100KHz Step			NR	
Input Range	-55dBm ~ -25dBm/Service		+30dBm (1W) max for LTE & NR		
Output Power	+40dBm (10W) max for LTE & NR				
Output Power Tolerance	+40dBm ±1dBm (10W ±0.0012W) for LTE & NR		+30dBm ±1dBm (1W ±0.0012W) for LTE & NR		
Channel Capacity	BW 20MHz * Contiguous 3CH			LTE	
	BW60MHz			NR	
Gain	Range	65dB ~ 95dB (Max 30dB)		ALC: 30dB	
	Adjust Step	0.5dB			
	Accuracy	±1dB			
Ripple	6dB p-p @ each CH				
Roll off	> 50dBc @ Channel OBW ±1MHz			LTE	
	> 30dBc @ Channel OBW ±1MHz			NR	
	> 50dBc @ Channel OBW ±1.5MHz				
EVM	Max / Min Input	QPSK	18.5%	LTE	
		16QAM	13.5%		
		64QAM	9%		
	Max / Min Input	QPSK	18.5%	NR	
		16QAM	13.5%		
		64QAM	9%		
		256AQAM	4.5%		
Frequency Error	< 0.05ppm				
System Delay	< 4us			LTE	
	< 2.41us			NR	
Noise Figure	Less than 5dB @ Max Gain			DL	
	Less than 5dB @ Max & Min Gain			UL	
VSWR	< 1.5 : 1				
ACLR	> 45dBc @±BW, > 45dBc @±2*BW				
Spurious Emission	-13dBm / 1 kHz: 9 kHz < f < 150 kHz			ITU category A	
	-13dBm / 10 kHz: 150 kHz < f < 30 MHz				
	-13dBm/100 kHz: 30 MHz < f < 1 GHz				
	-13dBm / 1 MHz: 1 GHz < f < 12.75 GHz				

Table 3. GST-IC-ELITE-TNR RF Performance Description

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	15 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		<u>Approved by</u>

4.2. ICS General Performance

No.	Parameter	Condition	Specification
1	Gain Re-Tracking Time after reset	Target Gain $\pm 1\text{dB}$	< 30 Sec
2	Isolation Sensing Range	-10dB < Gain < 10dB	Accuracy ± 2
3	$G = I + 10\text{dB}$	Static	General Operating
4	$G = I$	10Hz	Fast Fading

Table 4. GST-IC-ELITE-TNR ICS General Performance

4.3. CH Capacity Information

4.3.1. LTE Band 41

- Maximum configurable channel is contiguous 3channel

CH Name	Channel Frequency			BW(MHz)	EARFCN
	Start(MHz)	Center(MHz)	Stop(MHz)		
L01	2505.3	2514.3	2523.3	18	39833
L02	2525.1	2534.1	2543.1	18	40031
L03	2544.9	2553.9	2562.9	18	40229
L06	2619.8	2628.8	2637.8	18	40978
L07	2639.6	2648.6	2657.6	18	41176
L08	2659.4	2668.4	2677.4	18	41374
L13	2623.3	2632.3	2641.3	18	41013
L14	2643.1	2652.1	2661.1	18	41211
L15	2662.9	2671.9	2680.9	18	41409
L20	2626.6	2635.6	2644.6	18	41046
L21	2646.4	2655.4	2664.4	18	41244
L22	2666.2	2675.2	2684.2	18	41442

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	16 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

CH Name	Channel Frequency			BW(MHz)	EARFCN
	Start(MHz)	Center(MHz)	Stop(MHz)		
L27	2629.8	2638.8	2647.8	18	41078
L28	2649.6	2658.6	2667.6	18	41276
L29	2669.4	2678.4	2687.4	18	41474
L32	2613.3	2622.3	2631.3	18	40913
L33	2633.1	2642.1	2651.1	18	41111
L34	2652.9	2661.9	2670.9	18	41309
L37	2616.8	2625.8	2634.8	18	40942
L38	2636.6	2645.6	2654.6	18	41146
L39	2656.4	2665.4	2674.4	18	41344
L53	2631.4	2640.4	2649.4	18	41094
L54	2651.2	2660.2	2669.2	18	41292
L55	2671.0	2680.0	2689.0	18	41490

Table 5. GST-IC-ELITE-TNR Operation Band for LTE Band 41

4.3.2. NR Band N41

BW	Center FRQ Range(100KHz step)		NR-ARFCN Range	
	Start(MHz)	Stop(MHz)	Start	Stop
60MHz	2526.3	2660	505260	532000

Table 6. GST-IC-ELITE-TNR Operation Band for NR Band N41

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	17 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

4.5. Configuration & Mechanical Specification

Parameter	Specification	Remark
Donor/ Service Antenna Filter	Band Pass type for LTE & NR	Time Division
Power Supply	AC Input Voltage: 110-240V (50/60Hz) DC Output Voltage: +29V / +6V	
Operation Temperature	-30°C~+50°C (100%RH)	
Storage Temperature	-40°C~+85°C (5~95%RH)	
Connectors	Antenna: 4.3-10MiniDIN Female Ethernet: RJ-45 AC: MS22-2-3P FAN: MS20-15-7P RET: SU20SPR	On Bottom side
Size	22" x 14.1" x 8.6"(560mm x 360mm x 220mm)	Without Bracket
Weigh	Less than 30kg (66lb)	Without Bracket
Power Consumption	Less than 360W	
MTBF	100,000 hours or higher	
Internal Modem	LTE Modem primary	Back up with CDMA Modem
RET	Provide a physical Connection & 29V/1.5Amax	AISG 2.0 Standard
Dust Resistance	Telcordia GR63-CORE	
Vibration Resistance	1G, 10~150Hz, 0.1 Octaves/min	
Grounding	nonferrous metal and anchoring point on bottom side	For RF and power cabling
Environmental Spec.	NEMA4	IP 66
Sustained winds.	150mph	
Altitude	AMSL 10,000ft	
Mount Application	Metal or Wooden Poles	8"-20" outside diameter
Pollution degree	PD2	
Ovvoltage Category	OVC II	

Table 7. GST-IC-ELITE-TNR Mechanical & Environment conditions

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	18 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

5. System Block Configuration

5.1. RF Signal Flow (Outdoor)

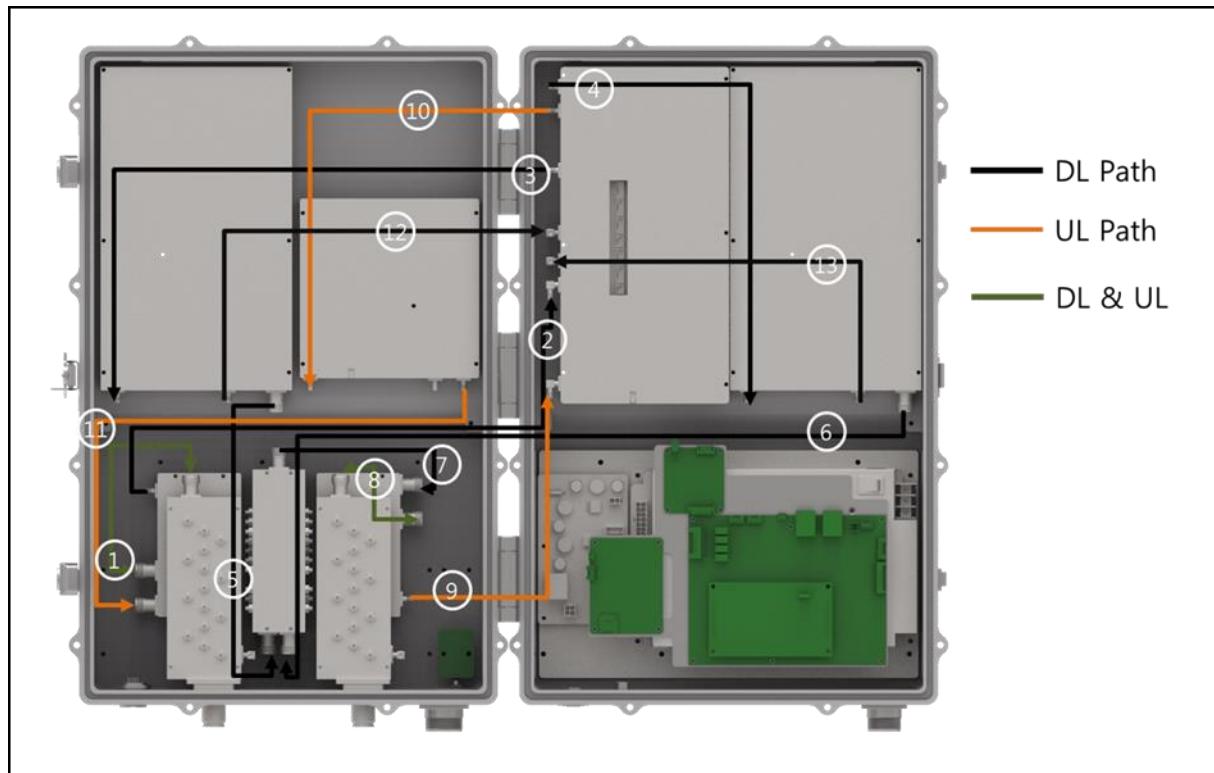


Figure 6. GST-IC-ELITE-TNR RF Signal Flow (Outdoor)

No	RF Signal Flow	No	RF Signal Flow
1	DL Input & UL Output	8	DL Output & UL Input
2	Donor Switch -> DL RF Module	9	Service Switch -> UL RF Module
3	DL RF Module -> DL LTE AMP	10	UL RF Module -> UL AMP
4	DL RF Module -> DL NR AMP	11	UL AMP -> Donor Switch
5	DL LTE AMP -> Combiner	12	LTE DL Reference F/B
6	DL NR AMP -> Combiner	13	NR DL Reference F/B
7	Combiner -> Service Switch		

Table 8. GST-IC-ELITE-TNR RF Signal Flow (Outdoor)

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	19 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

5.2. Data Signal Flow

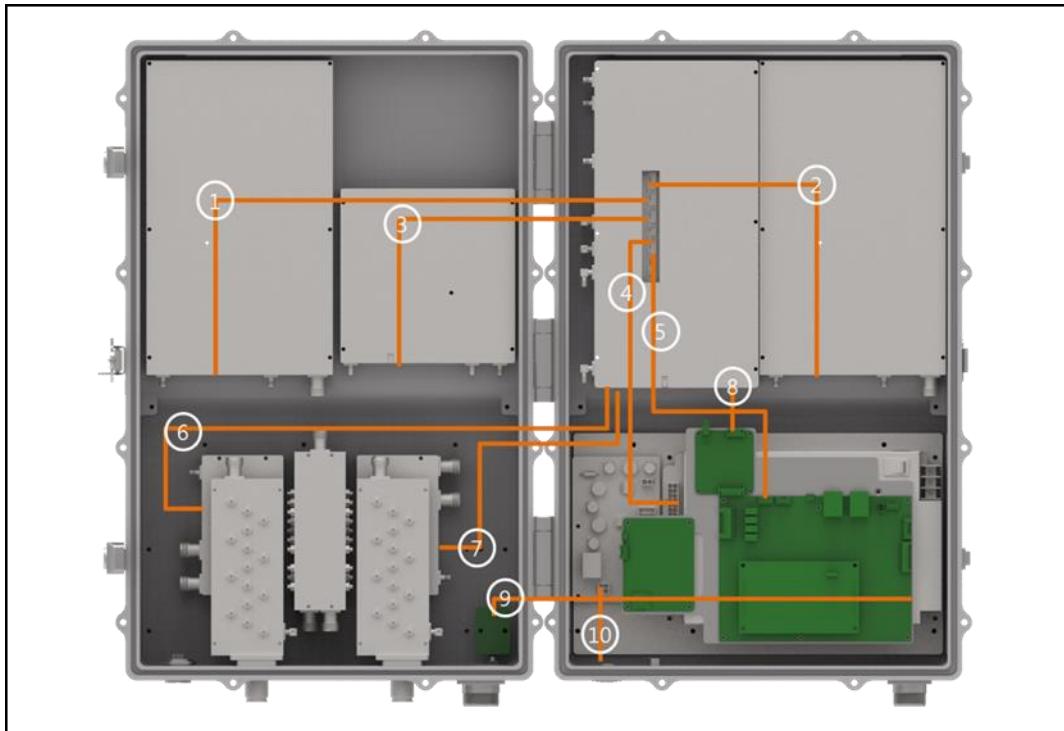


Figure 7. GST-IC-ELITE-TNR Signal and Data Flow

No	Data signal Flow	No	Data signal Flow
1	LTE DL AMP <-> DFM (LvTTL)	6	Donor Switch Control <-> DFM
2	NR DL AMP <-> DFM (LvTTL)	7	Service Switch Control <-> DFM
3	UL AMP <-> DFM	8	Fan Control <-> DFM
4	SMPS Alarm <-> DFM	9	LED Board <-> SNMP Board
5	DFM <-> SNMP Board(LvTTL)	10	RET Control Data

Table 9. GST-IC-ELITE-TNR Data Signal Flow

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	20 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

5.3. Power Supply Flow

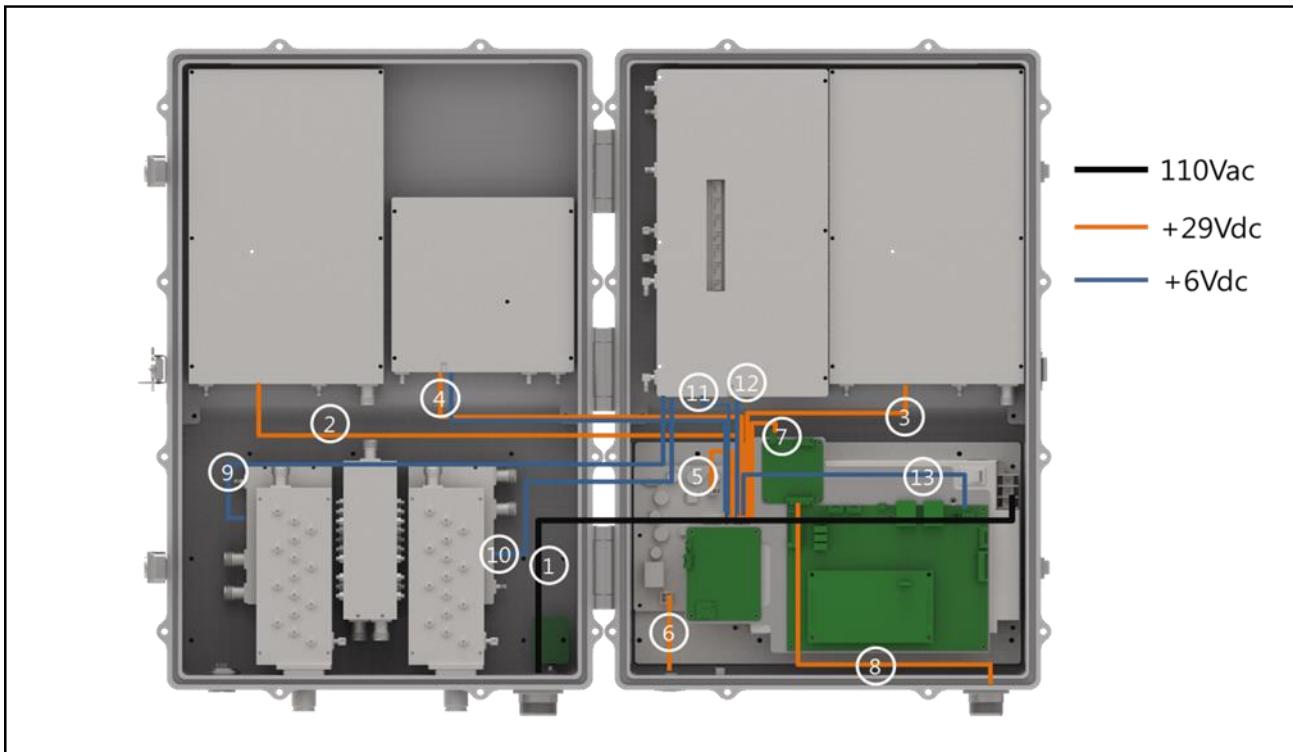


Figure 8. GST-IC-ELITE-TNR Power Supply Flow

No	Power Flow	No	Power Flow
1	AC 110V Input for SMPS	8	Supply 24V for FAN
2	Supply 29V for LTE DL AMP	9	Supply 6V for Donor Switch
3	Supply 29V for NR DL AMP	10	Supply 6V for Service Switch
4	Supply 29V & 6V for UL AMP	11	Supply 6V for RF Module
5	Supply 29V for RET Board	12	Supply 6V for DSP Module
6	Supply 29V for RET	13	Supply 6V for SNMP Board
7	Supply 29V for FAN Controller		

Table 10. GST-IC-ELITE-TNR Power Supply Flow

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	21 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		<u>Approved by</u>

6. Status/ Control & Alarm Monitoring

6.1. Status Monitoring and Control Parameters

- In case of control parameter, present status but also setting value display on Web-UI.

Parameter		Status	Control	Description
Downlink	RSSI	○		DL Input Power Display
	Output	○		DL Output Power Display
	System Gain	○		DL System Gain Display
	ALC		○	Set the ALC function On/Off
	ALC Low Limit		○	Set the ALC Low Limit Value
	Path On/Off		○	Decide to cut off to LTE or NR
	Attenuation		○	In order to adjust system gain, set the attenuation value
	Isolation (Unit: dB)	○		Display the isolation value between Donor antenna and Service antenna
	Band Selection		○	Select the band that user want to operate
	Final AMP		○	Set the High Power final AMP On/Off
Uplink	ASD		○	Set the Auto Shutdown function On/Off
	RSSI	○		UL Input Power Display
	Output	○		UL Output Power Display
	System Gain	○		UL System Gain Display
	ALC		○	Set the UL ALC function On/Off
	Path On/Off		○	Decide to cut off LTE or NR
	Attenuation		○	In order to adjust system gain, set the attenuation value
	Isolation (Unit: dB)	○		Display the isolation value between Donor antenna and Service antenna
	Gain Balance		○	Select the band that user want to operate & Set the Offset Value
	Final AMP		○	Set the High Power final AMP On/Off
Common	ASD		○	Set the Auto Shutdown function On/Off
	Site ID		○	Write the location Info. that install a repeater

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	22 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

Parameter	Status	Control	Description
Donor Site ID		<input type="radio"/>	Write the Donor Site Info. That install a repeater
Temp	<input type="radio"/>		Current Temperature in repeater
Temp. High Limit		<input type="radio"/>	Control Temp. Alarm Threshold
ILC		<input type="radio"/>	ILC Function On/Off
ILC Value		<input type="radio"/>	ILC Level Control
Alarm Delay		<input type="radio"/>	Set the delay time that transmit from repeater to Server
UL AMP		<input type="radio"/>	UL AMP On Off
DFM Version	<input type="radio"/>		Display a DFM Software Version
FPGA Version	<input type="radio"/>		Display a DL/UL FPGA Software Version
DFM Serial Number	<input type="radio"/>		Display a DFM Serial Number
TDD Mode		<input type="radio"/>	T-Sync Detect Mode Control

Table 11. GST-IC-ELITE-TNR Status Monitoring and Control Parameters

6.2. Alarm Monitoring

- All of alarms in Repeater are able to check thru Local Maintenance Port & Remote Site
- Provide to Alarm Mask function in order to ignoring unnecessary alarm

Parameter	Alarm conditions	Recovery
DL Over Output	Output power exceed a setting value (Band independently)	< Hysteresis 1dB
DL Low Output	Band Output power < Output power Low limit value	Opposite Condition
DL Low RSSI	Band RSSI < Input Low limit value	Opposite Condition
DL VSWR	Return loss < 5dB	Return loss > 7dB
DL Shutdown	By Over Output Alarm, By PLL Alarm, By Amp H/W Fail By Low Isolation	Alarm Off
AMP H/W Fail	Power AMP gain is poor AMP Output Power < DSP Output Power -20dB over 30sec	Power AMP Gain OK
DL Low Isolation	Isolation < 70dB	Opposite Condition
UL Low Isolation	Isolation < 70dB	Opposite Condition

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	23 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

Parameter	Alarm conditions	Recovery
UL Over Output	Output power Exceed a setting value (Band independently)	< Hysteresis 2dB
NR	DL Over Output	Output power exceed a setting value (Band independently)
	DL Low Output	Band Output power < Output power Low limit value
	DL Low RSSI	Band RSSI < Input Low limit value
	DL VSWR	Return loss < 5dB
	DL Shutdown	By Over Output Alarm, By PLL Alarm, By Amp H/W Fail By Low Isolation
	AMP H/W Fail	Power AMP gain is poor AMP Output Power < DSP Output Power -20dB over 30sec
	DL Low Isolation	Isolation < 70dB
	UL Low Isolation	Isolation < 70dB
	UL Over Output	Output power Exceed a setting value (Band independently)
	DFM HW Fail	DFM FPGA Fail (Judging from MCU, Except for RESET) DL/ UL Output Shutdown
Common	DFM Link Fail	Communication Fail between DFM & SNMP
	T-Sync Alarm	TDD Downlink Signal is not detected over 30sec
	T-Sync Link Fail	No response more than 10times
	Temperature	System: REAL Temp>Setting Value Refer to Final Amp Temperature : Alarm: 85°C~90°C / Shutdown: > 90°C
	DC Fail	Output voltage below 80%
	UL VSWR	Return loss < 5dB
	Total Alarm Display	Only System Outside LED

Table 12. Monitoring Alarm Parameters

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	24 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

7. Web-UI Overview

- Provide all functions that can be performed at the local craft port will be available thru the remote interface
- Support the GUI pages that will be addressable via the LTE/ CDMA wireless modem
- Support Remote access that will enable troubleshooting down to a specific location

7.1. Configuration the Laptop to Connect to the Repeater

- Connect an Ethernet crossover cable from the LAN port of the repeater's bottom side to your laptop

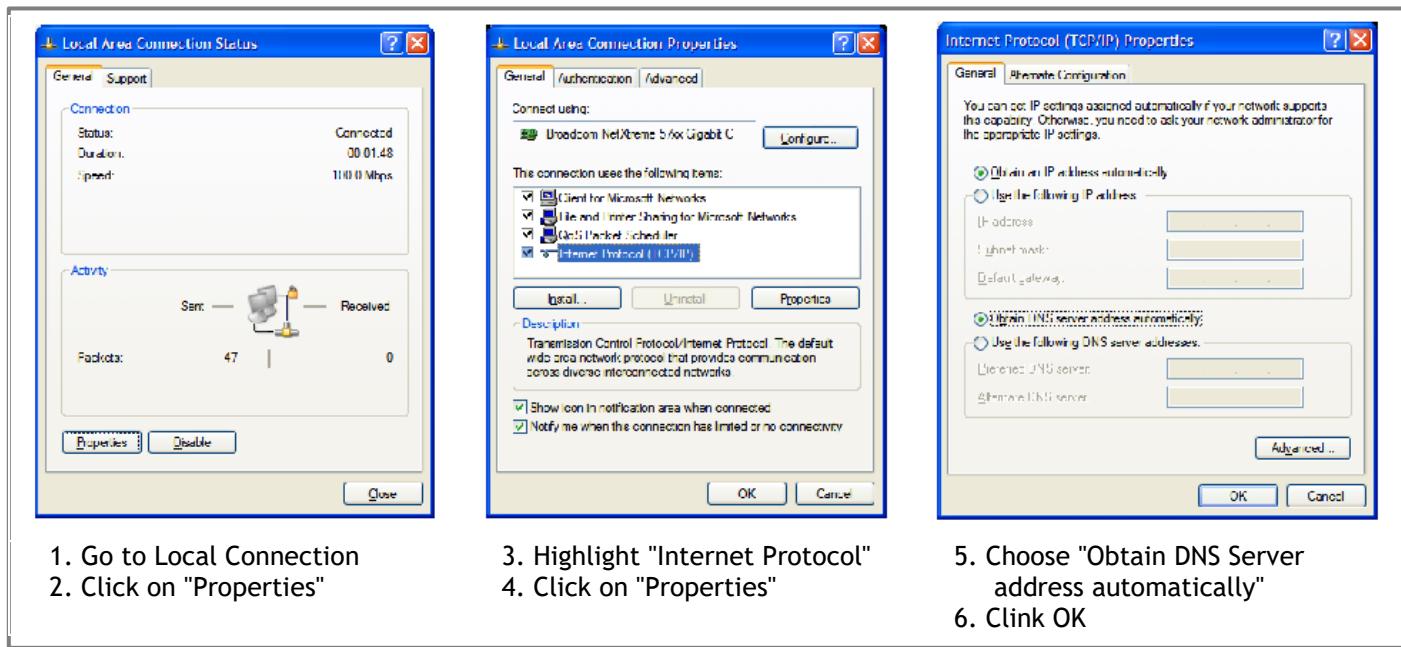


Figure 9. Laptop Configuration for connecting the Web-UI

	<u>Version</u>	<u>Date</u>	<u>Page</u>
	1.1	January 28th, 2019	25 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>
USER MANUAL			

7.2. Login-In Screen

- Web-UI Screen for Log-In
- After Logging, User can be able to operate Web-UI
- Register & Delete a User name/ Password: Refer to 8.6 User Management
- Display Total Alarm & Shutdown Status
- Enter the IP Address "192.168.1.1" into your browser address bar and you will be redirected to the Login page

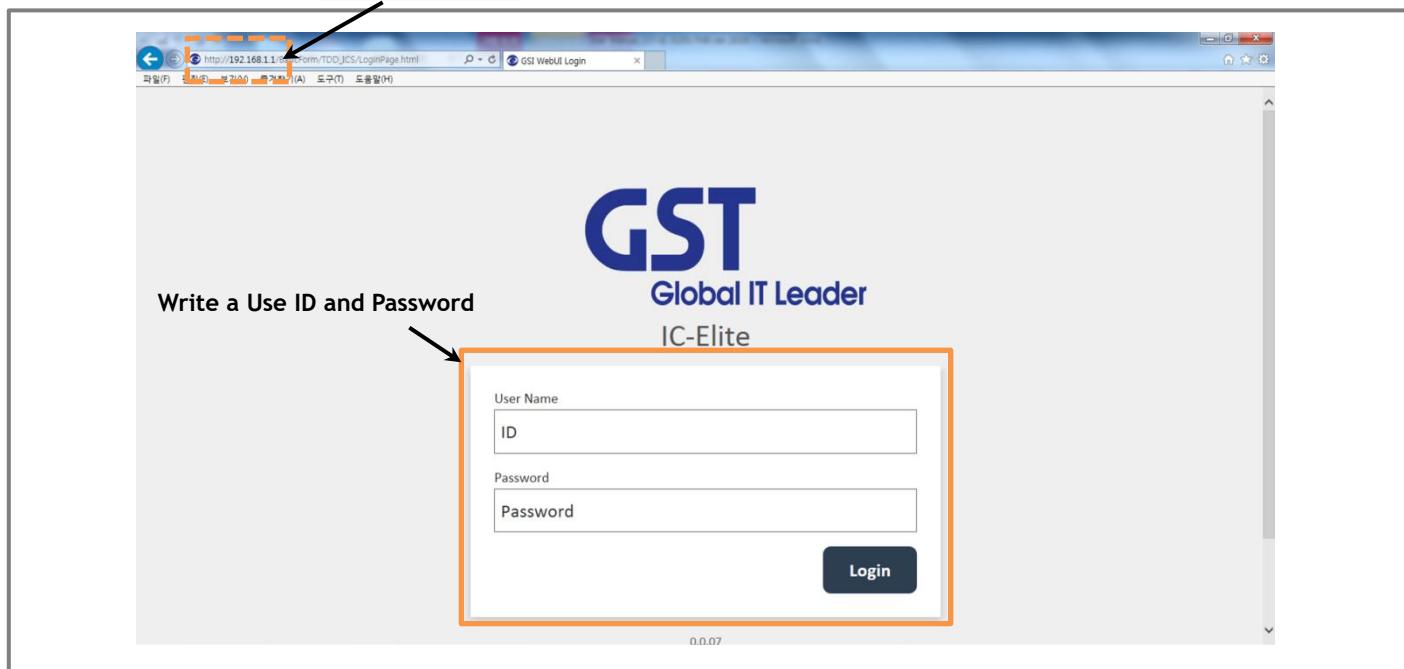


Figure 10. The way to Log-in on the Web Browser Screen

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	26 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		<u>Approved by</u>

7.3. RF Status & Control

- Web-UI Screen for display Repeater's RF Status & Control window

The screenshot shows the GST IC-Elite [TNR43] RF Status & Configuration web interface. The left sidebar lists navigation categories: MENU, Site Info., System Info., LTE Status & Control, LTE Alarm, NR Status & Control, NR Alarm, Common Alarm, and Channel Configuration. The main content area displays various status and configuration panels. Key sections include:

- Site Info.:** Software Version 0.0.07, Serial Number ABCD, Site ID KANSAS, Donor Site ID ABCD.
- System Info.:** Various system parameters like TEMP[F], ILC On/Off, Alarm Delay On/Off, DFM Version, and DFM Serial Number.
- LTE Status & Control:** 4G Downlink and 4G Uplink sections with controls for RSSI, Output(DSP), Output(Amp), Gain, ALC On/Off, User Att, AGC On/Off, Isolation, Band On/Off, Amp On/Off, and various shutdown/limit settings.
- LTE Alarm:** 4G Alarm section showing status for DL Over Output, DL Low Output, DL Low Input, DL VSWR, DL Shutdown, Amp H/W Fail, DL Isolation, Amp_Link, UL Over Output, PLL, and UL Isolation.
- NR Status & Control:** 5G Downlink and 5G Uplink sections with similar controls to the LTE sections.
- NR Alarm:** 5G Alarm section showing status for DL Over Output, DL Low Output, DL Low Input, DL VSWR, DL Shutdown, Amp H/W Fail, DL Isolation, Amp_Link, UL Over Output, PLL, and UL Isolation.
- Common Alarm:** Includes DFM HW, DFM Link Fail, T-Sync Alarm, T-Sync Link Fail, Temp, UL VSWR, AC FAIL, and DC FAIL.
- Channel Configuration:** Band Selection section for Ch, BW, and EARFCN across multiple bands (4G CH1, 4G CH2, 4G CH3, 5G).

Figure 11. RF Status monitoring & Control

	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 27 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

7.4. Alarm Configuration

- Web-UI Screen for Alarm Configurations
- Decide to activate an each alarm
- When "Report Alarm" is OFF, all alarms are disabled. When "Report Alarm" is ON, alarms can be Enable/ disabled individually

The screenshot shows the GST Web-UI interface for the IC-Elite [TNR43] device. The top navigation bar includes links for Home, RF, Config (which is currently selected), System, and Others, along with a Logout button. A dropdown menu under 'Config' shows 'Alarm' and 'Communication' options. The main content area displays device information: Software Version 0.0.07, Serial Number ABCD, Site ID KANSAS, and Donor Site ID ABCD. A 'Hide' button is visible next to a list of alarms. Below this is a section titled 'Alarm Configuration' with a sub-section for 'Serial Number:ABCD'. A dropdown menu for 'Report Alarm' is set to 'ON'. The main configuration table is titled 'Alarm Configuration' and lists eight alarms with columns for No., Name, Status, Severity, Last Triggered, and SNMP Mapping. Each row contains a status icon (green circle with a dot), a dropdown for Severity, the last trigger date/time, and a dropdown for SNMP Mapping. The bottom of the table shows a URL 'g/Alarm_Conf.html' and a note 'UL Low Isolation 4G'.

No	Name	Status	Severity	Last Triggered	SNMP Mapping
1	DL Over Output 4G	Green circle with dot	Critical	2007-01-07,05:0	None
2	DL Low Output 4G	Green circle with dot	Critical	2007-01-07,05:0	
3	DL LowInput 4G	Green circle with dot	Critical	2007-01-07,05:0	
4	DL ShutDown 4G	Green circle with dot	Critical	2007-01-07,05:0	
5	HW Fail 4G	Green circle with dot	Critical	2007-01-07,05:0	
6	DL Low Isolation 4G	Green circle with dot	Critical	2007-01-07,05:0	
7	PAU1 LinkFail	Green circle with dot	Critical	2007-01-07,05:0	
8	PLL Alarm 4G	Green circle with dot	Critical	2007-01-07,05:0	

Figure 12. System Alarm Configurations

	<u>Version</u>	<u>Date</u>	<u>Page</u>
	1.1	January 28th, 2019	28 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>
USER MANUAL			

7.5. Communication Configuration

- Web-UI Screen for Communication Configurations
- Set the information in order to connect to Sprint Server
- On this page you can change the various values related to IP network. Because the Web-UI is based on the IP network, incorrect configuration may make it impossible to connect to the Web-UI.
- In that case, Contact GSTeletechinc Technical Support for further instructions

The screenshot displays the 'Communication Configuration' section of the GST IC-Elite [TNR43] web interface. The page is organized into several sections:

- LAN:** Includes fields for Obtain IP Address (STATIC/DYNAMIC), IP address, Netmask, and Gateway.
- Waterproof Port:** Includes fields for WAN Interface (MODEM/OFF) and Obtain IP Address (STATIC/DYNAMIC), along with IP address, Netmask, and Gateway fields.
- SNMP Common:** Includes fields for Version, Manager IP, General Port, Trap Port, Heartbeat Interval (in minutes), Trap Option (Trap/No trap), Latitude, Longitude, and Trap Community.
- SNMP v2C:** Includes fields for Read Community, Write Community, and Trap Community.
- SNMP v3C:** Includes fields for Read User, Write User, Authentication (none/MD5/SHA), Privacy(Encryption) (none/AES128/AES256), Authentication Passphrase, Trap User, Trap Engine ID, Authentication (none/MD5/SHA), Privacy(Encryption) (none/AES128/AES256), and Authentication Passphrase.
- Date And Time:** Includes fields for Current Date (Jan 8 2007), Set Date(Year), Current Time(hour:minute) (01:22), Set Date(month, day), Time Zone (Alaska), Set Time(hour:minute), NTP Server, and NTP Reset Interval (in hours).
- Waterproof Port:** Includes a MAC address field (FA:D5:86:87:39:B6).
- Footer:** Copyright © All rights reserved.

Figure 13. System Information for connecting configurations

GST Delivering RF Performance	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 29 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

7.6. User Management

- Web-UI Screen for Management about user information
- On this page you can create and delete users, change passwords, and assign authorities to individual users
- Read Authority will only allow the user to view information on the menu pages, but cannot make any changes
- Read/ Write Authority means the user can view and change various values
- Super User is very similar to and Administrator account

The screenshot displays the GST User Management interface. The top navigation bar includes links for Home, RF, Config, System, Others, and Logout. A sub-menu for 'User Management' is currently active. The main content area has two panels: 'Edit User' on the left and 'User List' on the right. The 'Edit User' panel contains fields for User Name, Password, Password Confirm, and Authority (with 'Read' selected). The 'User List' panel shows a single user entry: 'admin admin01'. A warning message at the bottom states: 'User name and password must be 5~8 characters.' and 'CAUTION: DO NOT DELETE 'admin''. The footer includes copyright information and a link to '/User_Management.html'.

Figure 14. System Information about User Management

	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 30 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

7.7. Alarm Log

- Web-UI Screen for finding Alarm log
- You can see the history of reported and reset Alarms. When an alarm is reported, the name and time of the alarm is displayed along with its current status
- **Red** means the alarm is reported, **Green** means the alarm has returned to normal status
- An alarm will only be reported if the alarm condition lasts longer than the set value in the "Delay Alarm Reporting Minutes" field, found on the RF configuration page

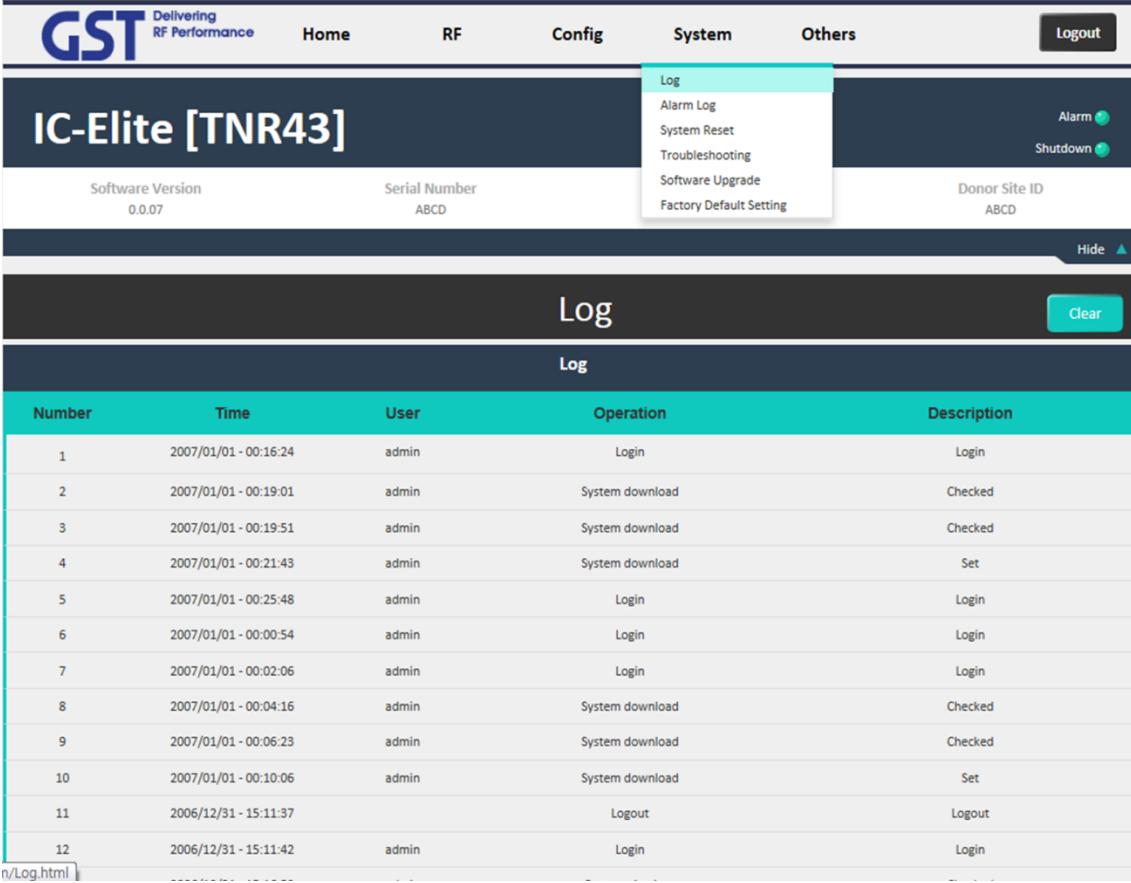
Number	Last Triggered	Status	Alarm Name
1	2007-01-06, 05:29:24	Green	Reset
2	2007-01-06, 05:29:24	Green	Reset
3	2007-01-06, 05:29:23	Green	Reset
4	2007-01-06, 05:29:24	Green	Reset
5	2007-01-06, 05:29:24	Green	Reset
6	2007-01-06, 05:29:24	Green	Reset
7	2007-01-06, 05:26:47	Green	Reset
8	2007-01-06, 05:26:47	Green	Reset
9	2007-01-06, 05:26:38	Green	Reset
10	2007-01-06, 05:23:29	Green	Reset
11	2007-01-06, 05:23:29	Green	Reset

Figure 15. The way to check System Alarm Log

	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 31 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

7.8. Log

- Web-UI Screen for reading a List of operation history
- Logs will maintain a history of up to 30 cycles



The screenshot shows the IC-Elite [TNR43] web interface. At the top, there is a navigation bar with links for Home, RF, Config, System, Others, and Logout. The 'System' menu is currently active, with a dropdown menu showing options like Log, Alarm Log, System Reset, Troubleshooting, Software Upgrade, and Factory Default Setting. Below the navigation bar, the main content area displays the software version (0.0.07) and serial number (ABCD). A large button labeled 'Log' is prominently displayed. Below this, a table titled 'Log' lists 12 entries of system activity:

Number	Time	User	Operation	Description
1	2007/01/01 - 00:16:24	admin	Login	Login
2	2007/01/01 - 00:19:01	admin	System download	Checked
3	2007/01/01 - 00:19:51	admin	System download	Checked
4	2007/01/01 - 00:21:43	admin	System download	Set
5	2007/01/01 - 00:25:48	admin	Login	Login
6	2007/01/01 - 00:00:54	admin	Login	Login
7	2007/01/01 - 00:02:06	admin	Login	Login
8	2007/01/01 - 00:04:16	admin	System download	Checked
9	2007/01/01 - 00:06:23	admin	System download	Checked
10	2007/01/01 - 00:10:06	admin	System download	Set
11	2006/12/31 - 15:11:37		Logout	Logout
12	2006/12/31 - 15:11:42	admin	Login	Login

Figure 16. The way to read a Log History

GST Delivering RF Performance	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 32 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

7.9. Troubleshooting

- Web-UI Screen for informing a contact information in case of occurring Field Troubleshooting

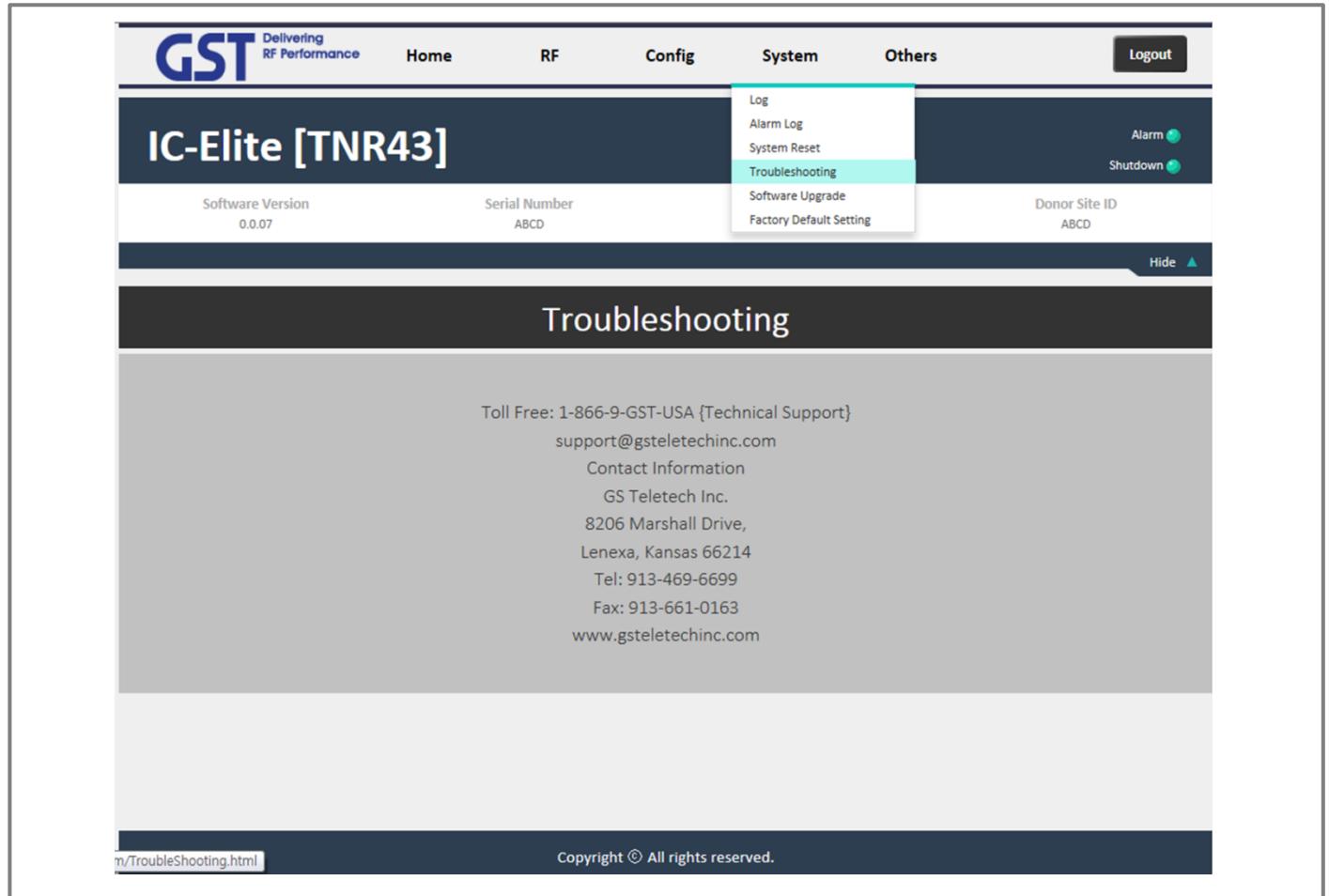


Figure 17. The information of Contact point in case of occurring Field Troubleshooting

GST Delivering RF Performance	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 33 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

7.10. Software Update

- Web-UI Screen for downloading a software
- Procedure
 - 1) Go to "Remote Software Upgrade" link
 - 2) Click Browse button to select the upgrade file from the laptop
 - 3) Choose the file to upgrade. Provided by manufacturer. After you choose the file, You should click "upload" to send the file from your laptop to the Repeater
 - 4) Once the file name and file size are displayed, click "Upgrade" to start the upgrade installation
 - 5) Provided file will have the following format:

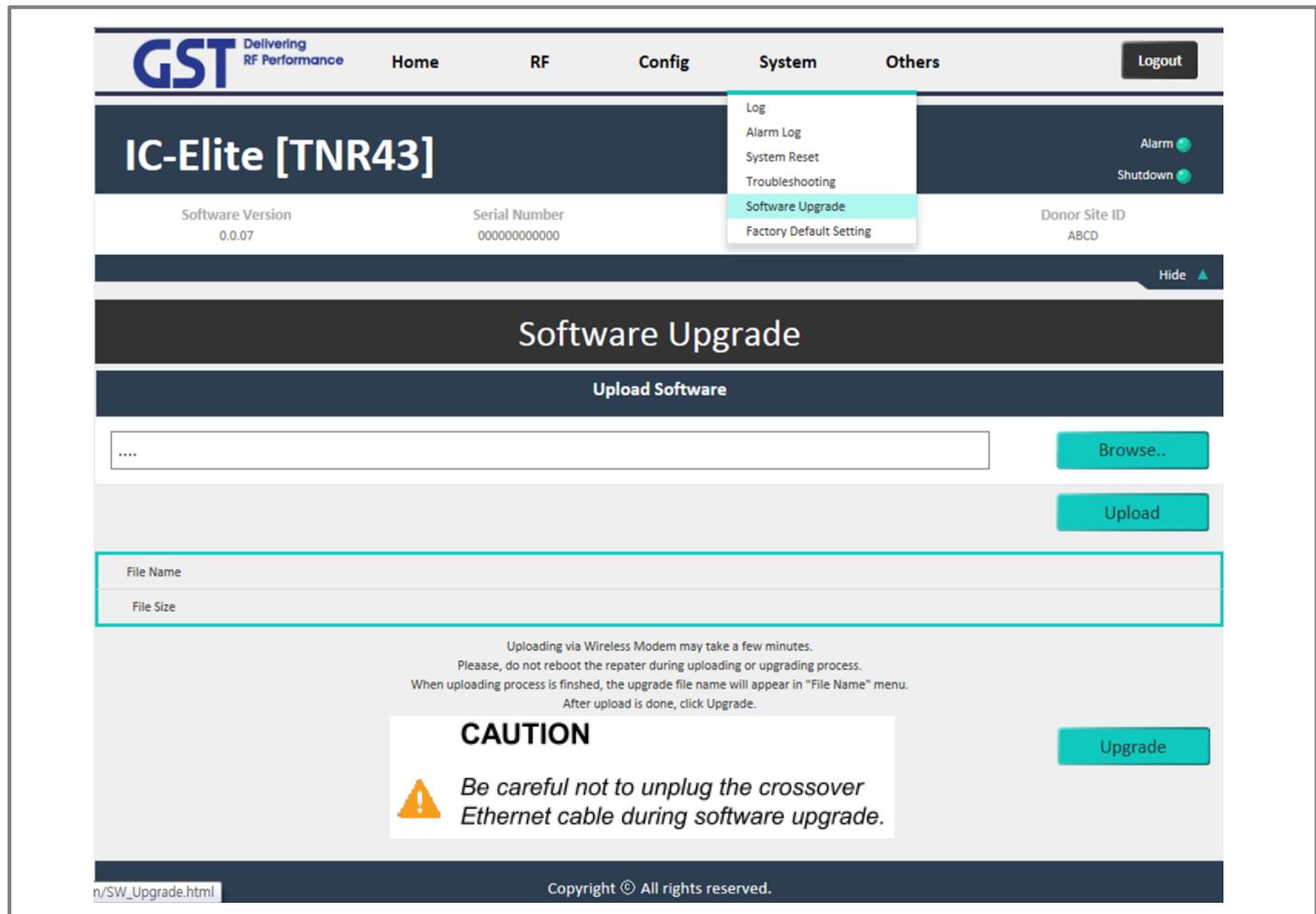


Figure 18. The way to reload new software using the Web-UI

	<u>Version</u>	<u>Date</u>	<u>Page</u>
	1.1	January 28th, 2019	34 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>
USER MANUAL			

7.11. System Reset

- Web-UI Screen for resetting the system
- Click on the desired reset action
- Clink "Yes" to reset the repeater via a soft-boot. This will not change any of the current settings

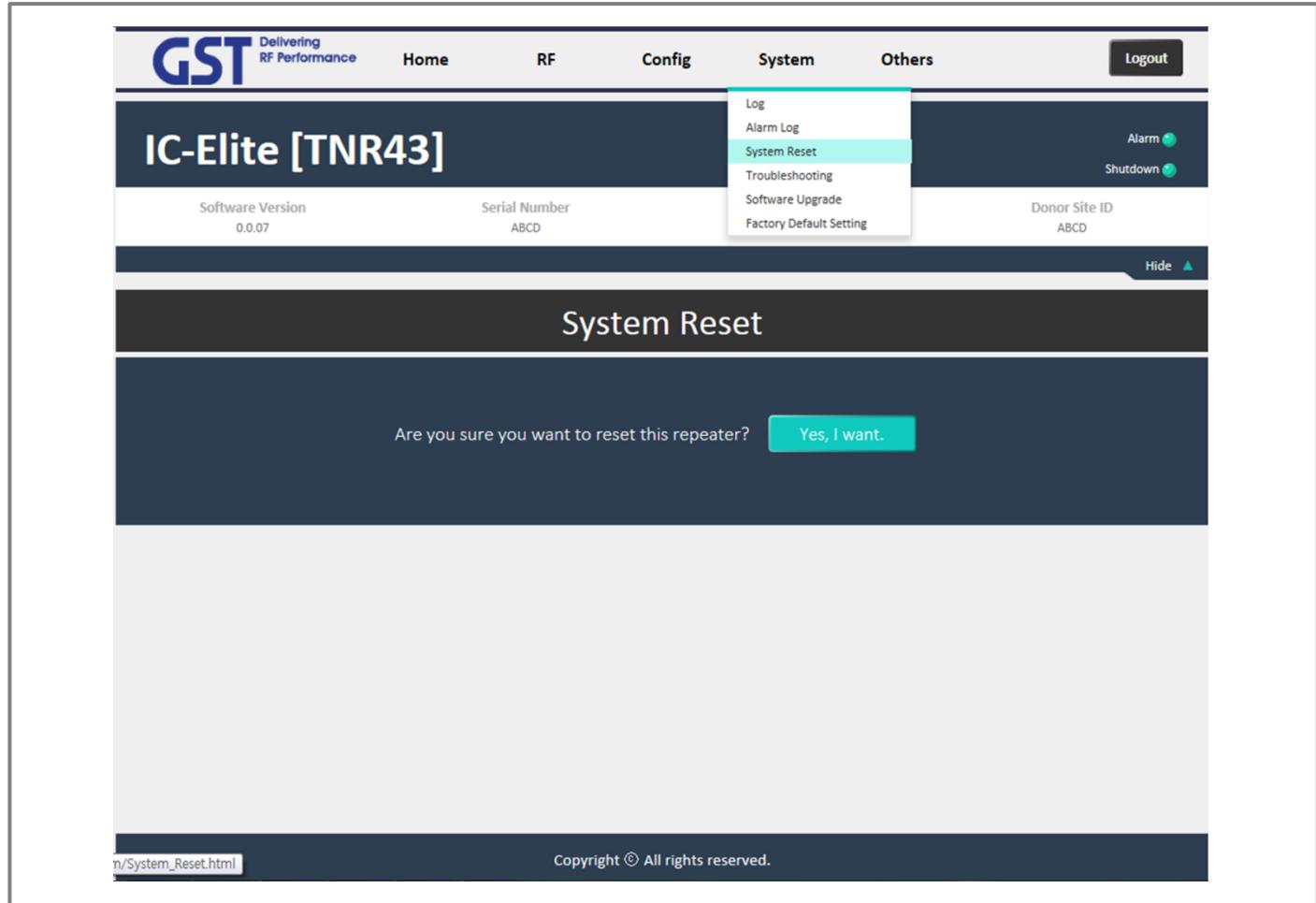


Figure 19. The way to reset the system using the Web-UI

GST Delivering RF Performance	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 35 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

7.12. Factory Default Setting

- Web-UI Screen for Default Setting before operating

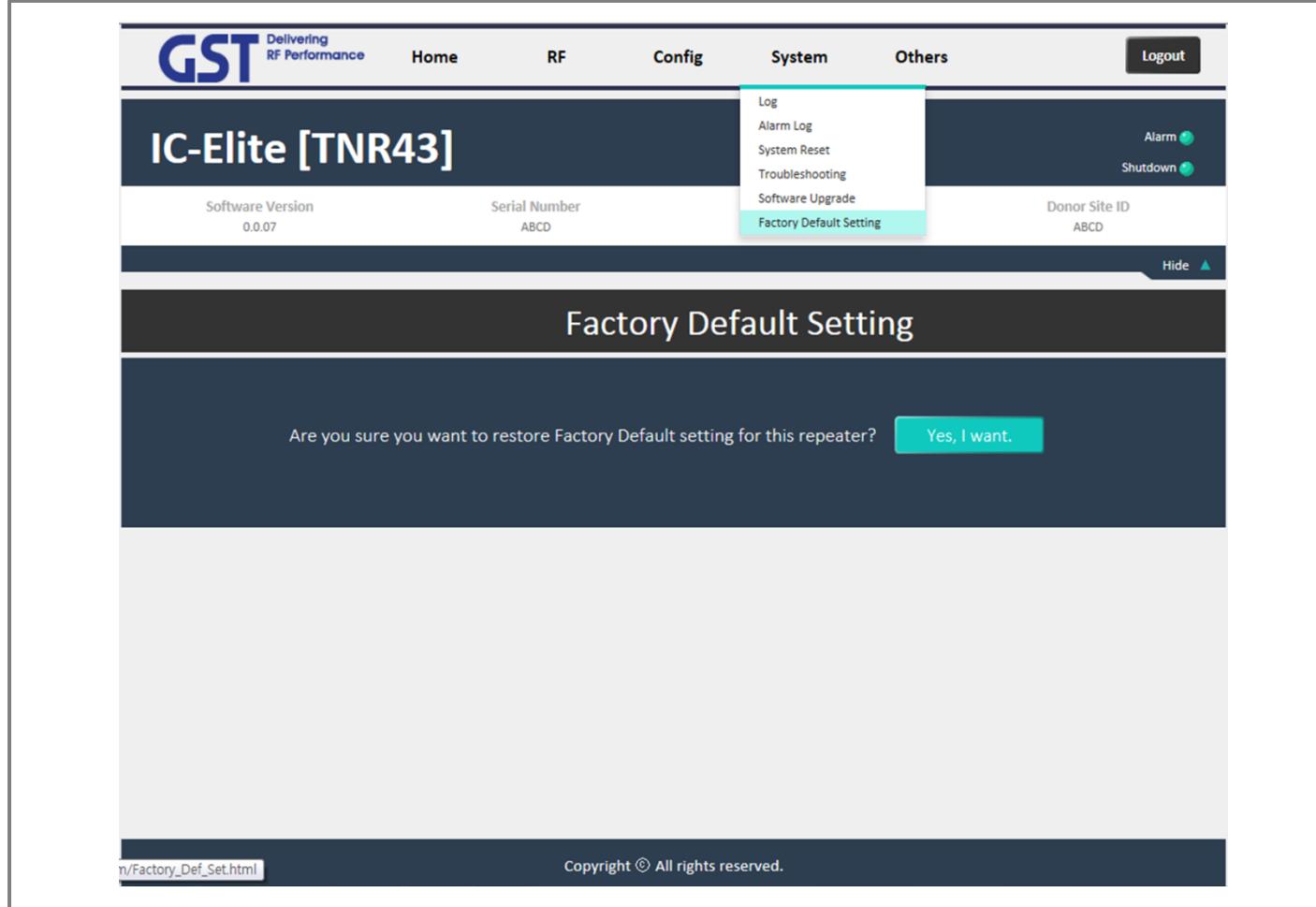


Figure 20. The way to restore Factory Default Setting for repeater

GST Delivering RF Performance	<u>Version</u> 1.1	<u>Date</u> January 28th, 2019	<u>Page</u> 36 / 47
<u>Title</u> USER MANUAL	<u>Prepared by</u>	<u>Reviewed by</u>	<u>Approved by</u>

7.13. Configuration Transfer

- Web-UI Screen for mutual information transfer between Repeater and Local Craft

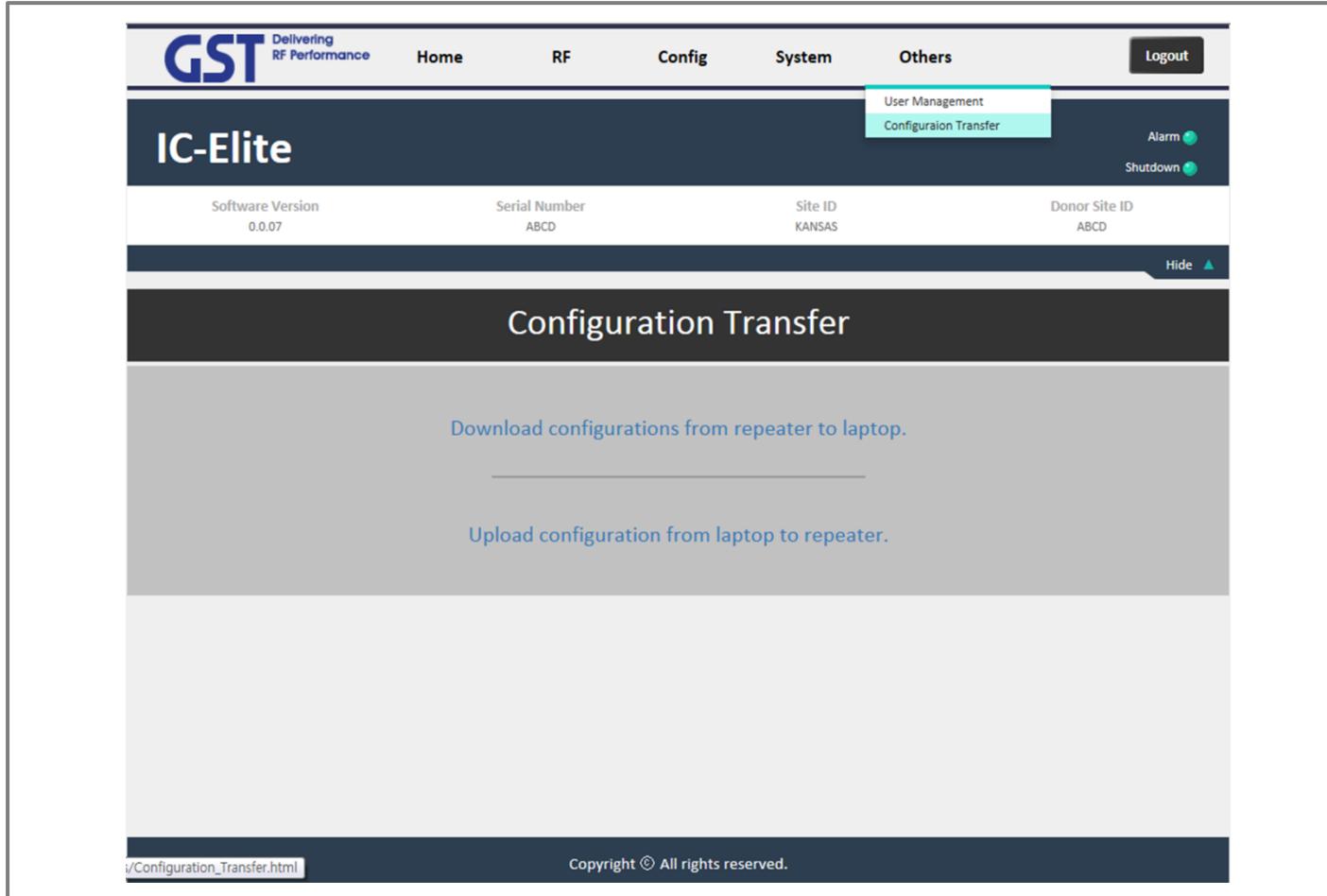


Figure 21. The way to down/ up load configuration between laptop and repeater

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	37 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

8. System Installation

- This chapter describes how to install the repeater and Cabling method
- The needed accessories and tools are listed up as below
- More detailed information about installation, refer to the MOP(Manufacturer Operating Process)

#	Contents		Picture	Q'ty
1	Mounting Bracket (wall mount)			1EA
2	AC Power Cable SJT AWG, 6ft			1EA
3	Installation purchase	M6x15mm BOLT, SEMS		4EA
4	Mounting Screw set	LAG SCREW 3/8"x5", SCM440		4EA
		LAG SCREW 3/8"x2", SCM440		4EA
		HEX BOLT 3/8"x2", SCM440		4EA
		HEX NUT 3/8", SCM440		8EA
		Φ10.5mm/Φ21mm PLAIN WASHER		12EA
		Φ10.2mm/Φ18.4mm SPRING WASHER		8EA

Table 13. GST-Ic-ELITE-TNR Installation Accessories

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	38 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

8.1. Warnings and Hazards

8.1.1. Electric Shock



- Opening the Repeater could result in electrical shock and may cause severe injury
- Operating the Repeater with antennas in very close proximity facing each other could lead to severe damage to the repeater

8.1.2. Exposure to RF



Working with the repeater while in operation, may expose the technician to RF electromagnetic fields that exceed FCC Rules for human exposure.

Visit the FCC Website at <http://www.fcc.gov/oet/rfsafety> to learn more about The effects of exposure to RF electromagnetic fields

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	39 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

8.2. Cabling

The cabling diagram of the GST-IC-ELITE TNR-Outdoor is as follows

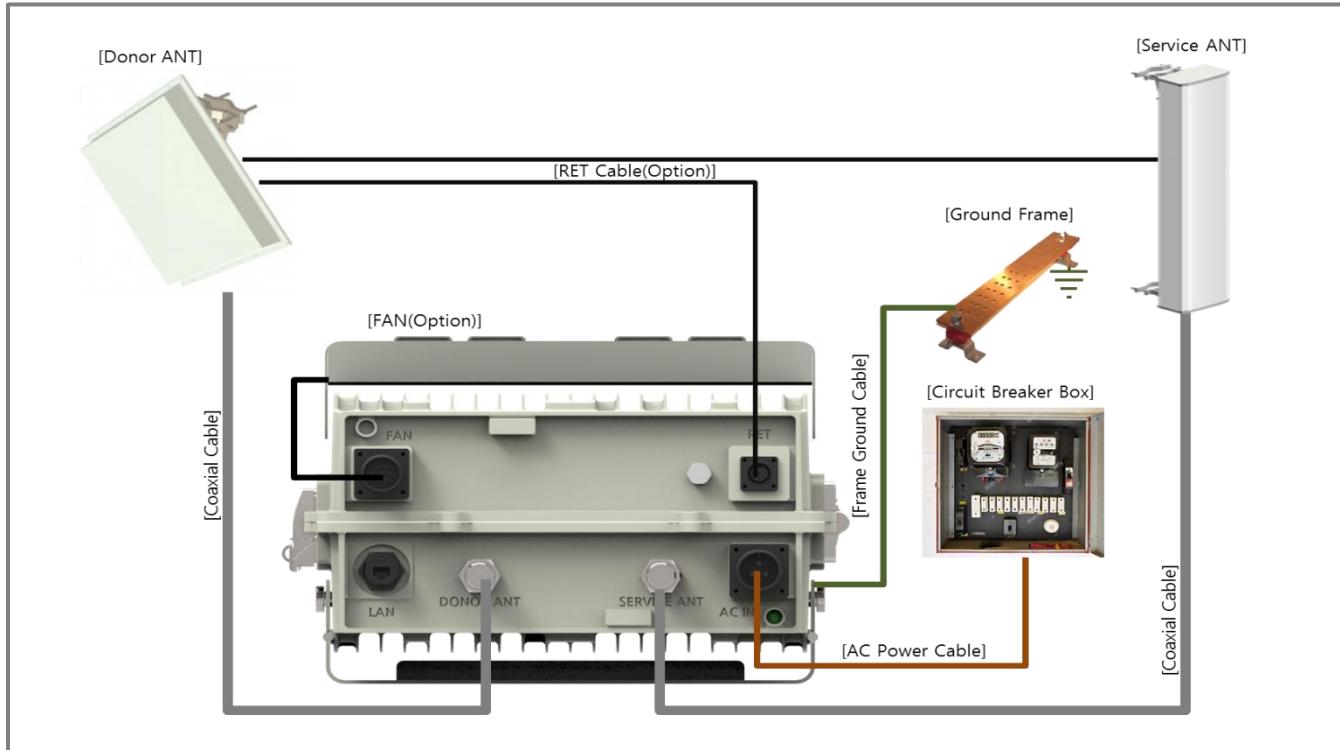


Figure 22. GST-IC-ELITE-TNR-Outdoor Cabling Diagram

From	To	Cable
GST-IC-ELITE TNR	MGB	Frame Ground Cable: AWG 6/ 6ft
	Circuit Breaker Box	AC Power Cable: AWG 16/ 6ft
	RF Antennas	RF Antenna Feeder Cable: 1/2 inch Feeder Line
		RET control Cable (option)

Table 14. GST-IC-ELITE-TNR-Outdoor Connecting Cable

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	40 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

**No use for the unauthorized device**

When installing the system, must check the devices that use is authorized.

This conditions apply antenna, cable and coupling device if necessary.

**Circuit Breaker Installation in the Box for Overcurrent Protection**

Must install the circuit breaker between the system and main AC source for separating.

Make sure to install the Circuit breaker on the place to operate easily

Circuit Breaker is able to operate up to 20A

and do not exceeds a distance from circuit breaker box to repeater is 5ft

**Terminal, Conduit and Cable Size**

To install the conduit is according to NAE regulation, and Terminal size is according to NEC regulation

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	41 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

8.3. Installation Guide for Crew

8.3.1. Wall Mount Installation

The procedure for fixing the wall type system is as follows:

- 1) Wall Mounting Bracket Shape



Figure 23. Mounting Bracket Shape

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	42 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

- 2) To mount the system on the wall, first fix the bracket on the wanted position

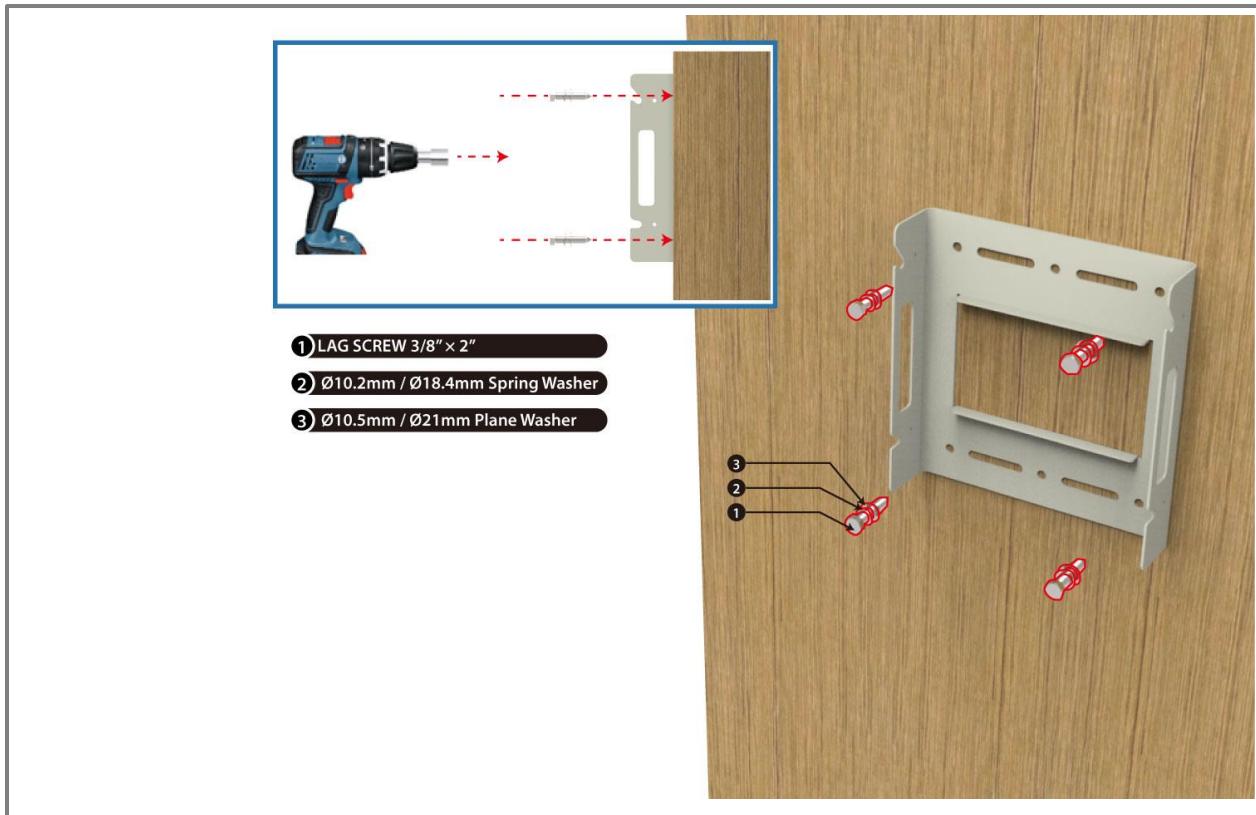


Figure 24. Fixing the Bracket for installing a Wall Mount



Wall Thickness

Wall thickness to fix the system is 1.5 inch over at least.

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	43 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

- 3) Hang the system to the hooking position at the top of the mounting bracket



Figure 25. The way to hang the system for Wall Mounting

- 4) Align the system with the fixing holes of the mounting bracket and fix them firmly

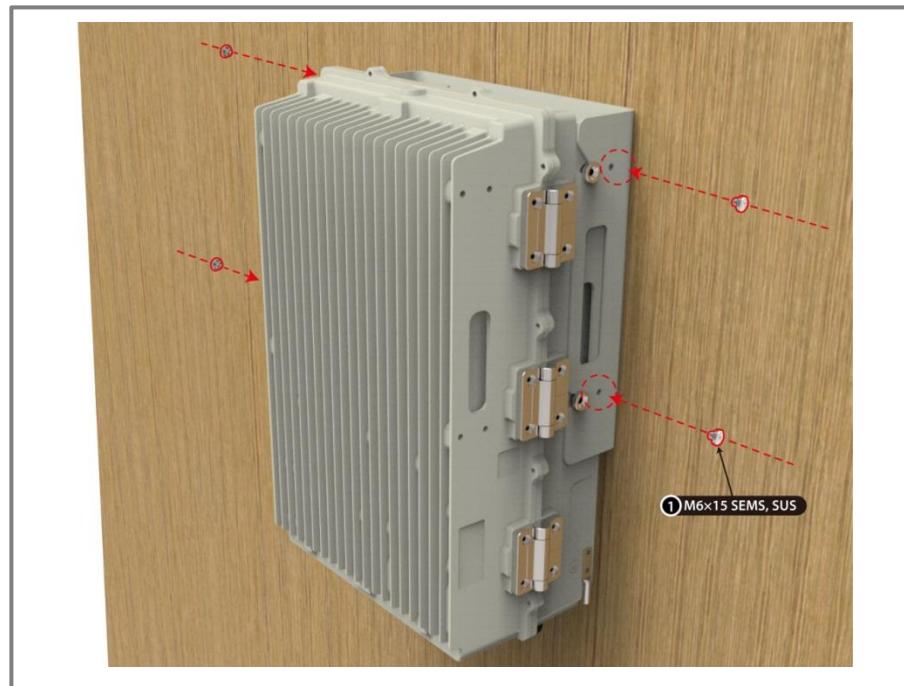


Figure 26. The way to fix firmly the System for Wall Mounting

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	44 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

8.4. Cable Connection

8.4.1. AC Power cable connection

- Repeater supports a free AC Input voltage from 110V to 220V
- The pin description of AC Port is below. User should connect exact polarity of AC

Port Outlook (Fixed Side)	Port numbering	NAME	Description
 MS-3102A-10SL-3P	A	AC_H	AC Hot
	B	AC_N	AC Neutral
	C	F.G	Frame Ground

Table 15. AC Power Connector Configuration

8.4.2. FAN Power Cable Connection (OPTION)

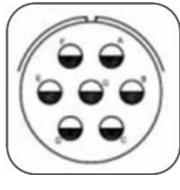
Port Outlook (Fixed Side)	Port numbering	NAME	Description
 MS3102A14S-2P	A	RED	+24 VDC
	B	RED	+24 VDC
	C	BLACK	GND
	D	BLACK	GND
	E	YELLOW	FAN Alarm #1
	F	YELLOW	FAN Alarm #2

Table 16. GST-IC-ELIT TNR FAN Power Cable Connection

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	45 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

8.4.3. RET Cable Connection (Option)

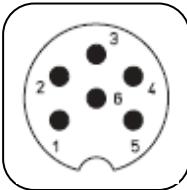
Port Outlook (Fixed Side)	Port numbering	NAME	Description
 SU20SPR-8S	3	RS485B	Communication
	4	DGND	Frame Ground
	5	RS485A	Communication
	6	+29 V	1.5A max
	7	DC Return	Retune DC Power
	1, 2, 8	NC	-

Table 17. GST-IC-ELIT TNR RET Cable Connection

8.4.4. Local Maintenance Connection

- Repeater Support a RJ-45 connector for local maintenance

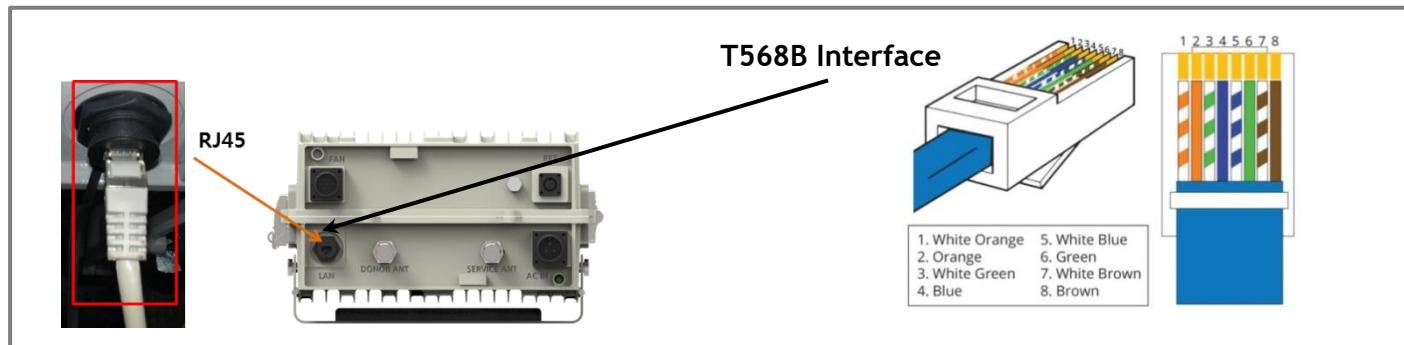
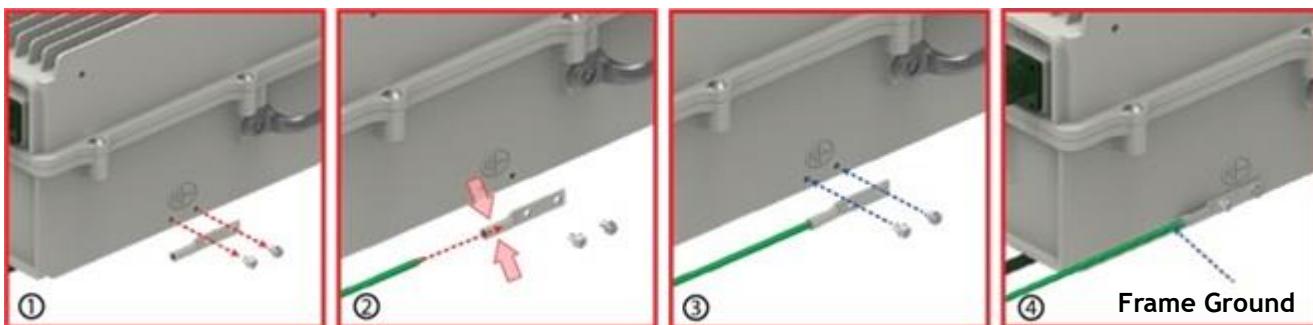


Figure 27. RJ-45 Interface for connecting the Local Maintenance

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	46 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

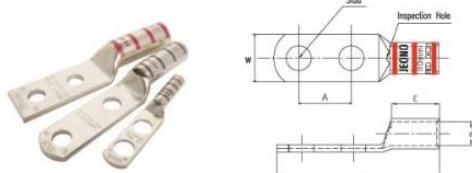
8.4.5. Grounding cable Connection

- JOCT 0202-RL05 Lug supports AWG #6. The way to install the grounding cable is below



TUBULAR CABLE LUGS, TWO-HOLE, STANDARD BARREL AND LONG BARREL
TYPE-CT

- Material : Electrolytic Copper (TPC)
- Surface : Tin Plated
- With Inspection Hole
- Color Coded to Show Proper Die Number and Color 10mΩ-630mΩ
- To IEC 60228 Class 2 and Class 5
- UL Listed 486A-486B up to 35KV



Part No Explanation : JOCO 0201-X X 04 → Stud Size(mm, UNC)

Tongue Form R : Round Type Barrel Form *S : Standard Barrel Type
S : Square Type *L : Long Barrel Type

Part Number	Wire Range				Stud Size	Dimension (mm)						Color Code & Die No	Q'ty / bag			
	CODE		FLEX			W	d	A	E		L					
	AWG	mm ²	AWG	mm ²					*S	*L	*S	*L				
JOCT 0202-XX05	6	16	6	16	M5	12		16			52	67	Blue 24 JOCD-6	300		
JOCT 0202-XX06					M6				15							
JOCT 0202-XX08					M8	15.5		19			67	82				
JOCT 0202-XX10					M10				22							
JOCT 0202-XX12					M12	18					70	85				

Figure 28. The way to install the Frame Ground Cable and Lug specifications

<u>Version</u>	<u>Date</u>	<u>Page</u>
1.1	January 28th, 2019	47 / 47
<u>Title</u>	<u>Prepared by</u>	<u>Reviewed by</u>
USER MANUAL		

9. FCC Warning Statement

<FCC Warning Statements>

FCC Part 15.105 statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Part 15.21 statement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF Exposure Statement

The antenna(s) must be installed such that a minimum separation distance of at least **360 cm** is maintained between the radiator (antenna) and all persons at all times. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

licensee consent

Any personnel involved in installation, operation or service of the repeaters must understand and obey the following:

- You **MUST** REGISTER THIS DEVICE with your wireless provider and have your provider's consent.
- If you are unsure, contact your provider
- The device can be operated for CMRS (Commercial Mobile Radio Service)

Signal booster warning label message

WARNING. This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENSEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

- Use of unauthorized antennas, cables, and/or coupling devices not conforming with ERP/EIRP and/or indoor-only restrictions is prohibited.
- Home/ personal use are prohibited

Supplier's Declaration of Conformity
47 CFR § 2.1077 Compliance Information

Unique Identifier: IC-ELITE TNR43

Responsible Party – U.S. Contact Information

GSTeletech, Inc.
8206 Marshall Drive,
Lenexa, Kansas 66214

Contact point

Charles You

chyu@gsteletechinc.com

Office : 1-913-469-6699

Fax : 1-913-661-0163

FCC Compliance Statement (*e.g.*, products subject to Part 15)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.