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ST8500 Hybrid PLC&RF connectivity development kit – G3 GUI quick start guide

Rev. 2

Jun 2021

Introduction

- Scope of this presentation is to help you on starting the evaluation of G3-PLC Hybrid communication using EVLKST8500GH868 or EVLKST8500GH915 with the G3 GUI
- Steps to be performed:
  1. Upgrade to the latest FW from the STSW-ST8500GH package available at https://www.st.com/content/st_com/en/products/embedded-software/evaluation-tool-software/stsw-st8500gh.html
  2. Open the GUI and configure the development kit
  3. Perform communication tests
     1. PHY layer
     2. IPv6 layer

NUCLEO-G070RB FW upgrade

- After installing the STM32 CubeProgrammer (available on https://www.st.com/content/st_com/en/products/development-tools/software-development-tools/stm32-software-development-tools/stm32-programmers/stm32cubeprog.html), connect the USB cable to the NUCLEO-G070RB USB connector and launch the appropriate batch (.bat) file, based on the network role and kit type (EVLKST8500GH868 or EVLKST8500GH915).
- Please note that for each G3-PLC network only one node must be programmed as Coordinator.
- Please connect one EVLKST8500GH at a time.

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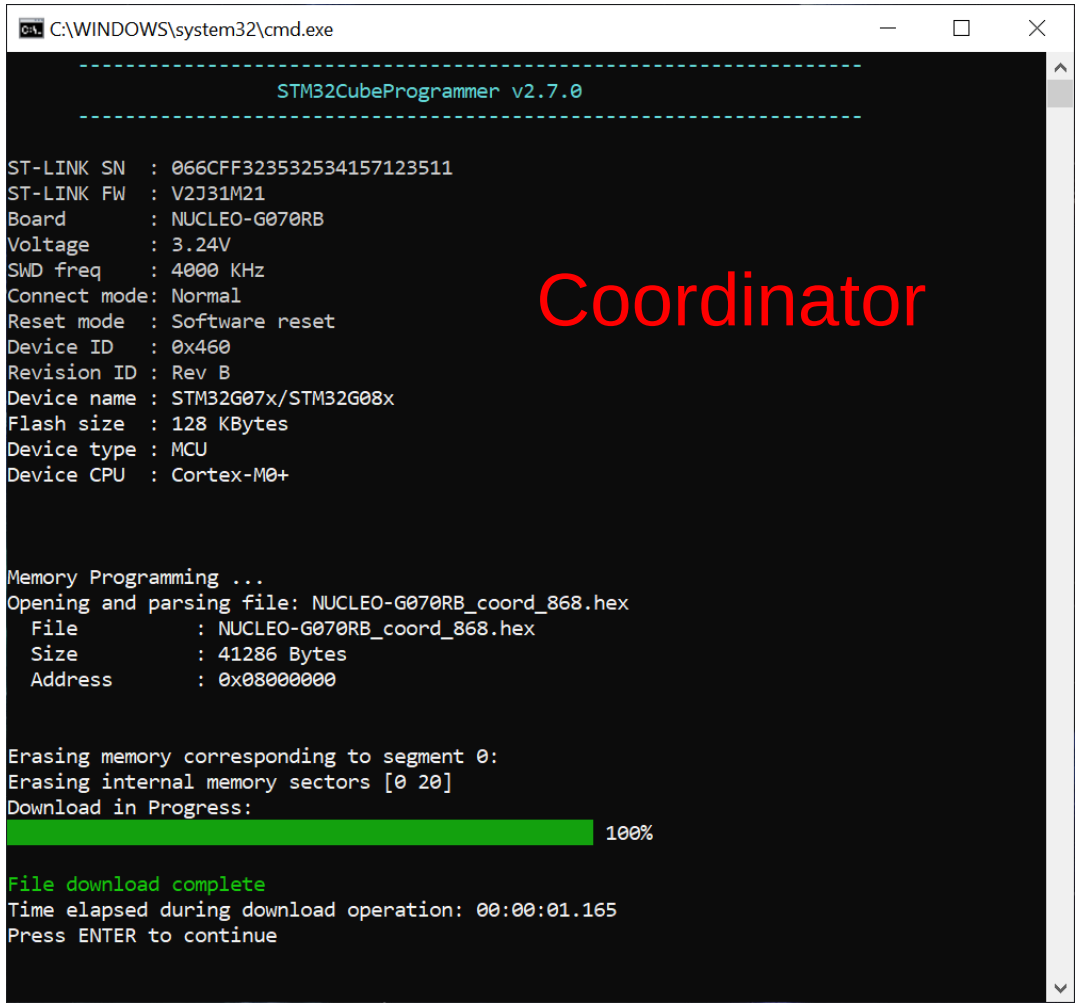
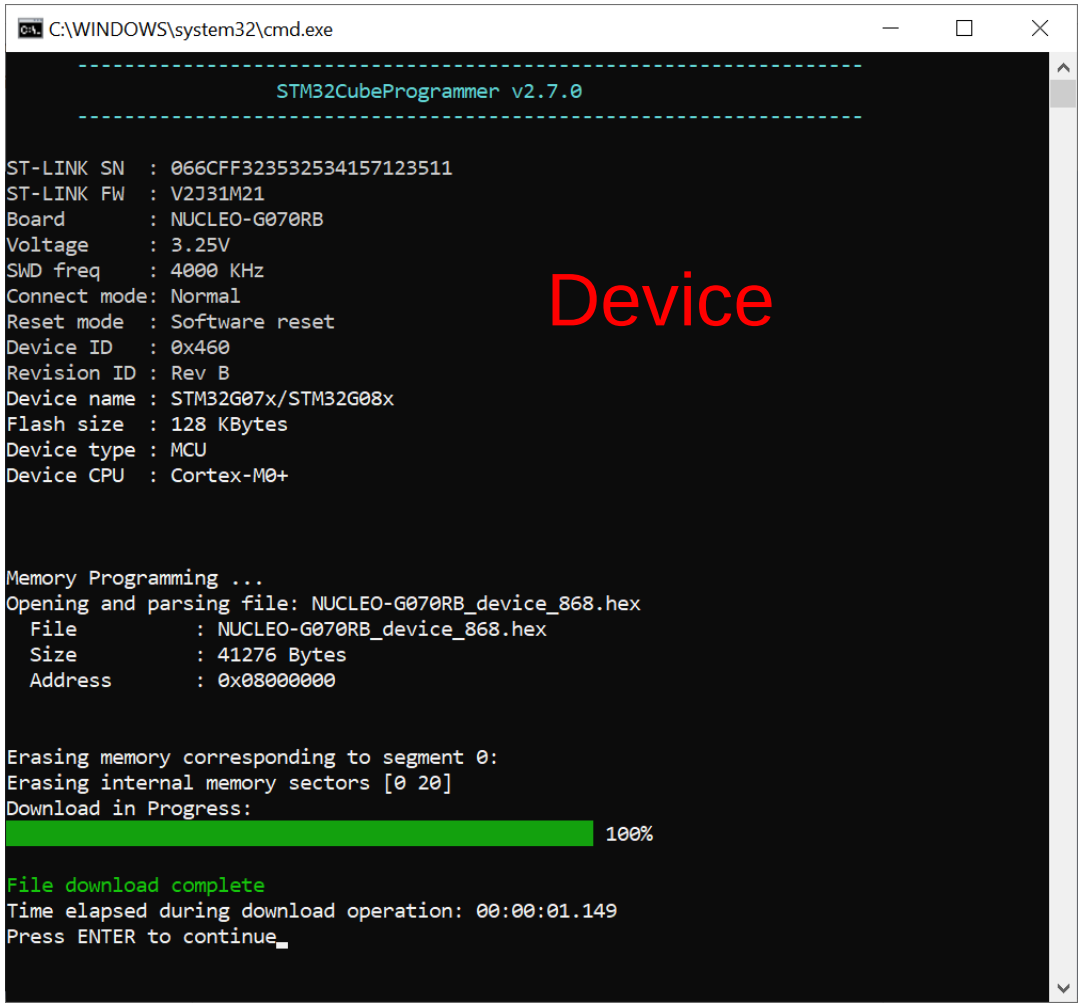
NUCLEO-G070RB FW upgrade (868 MHz)





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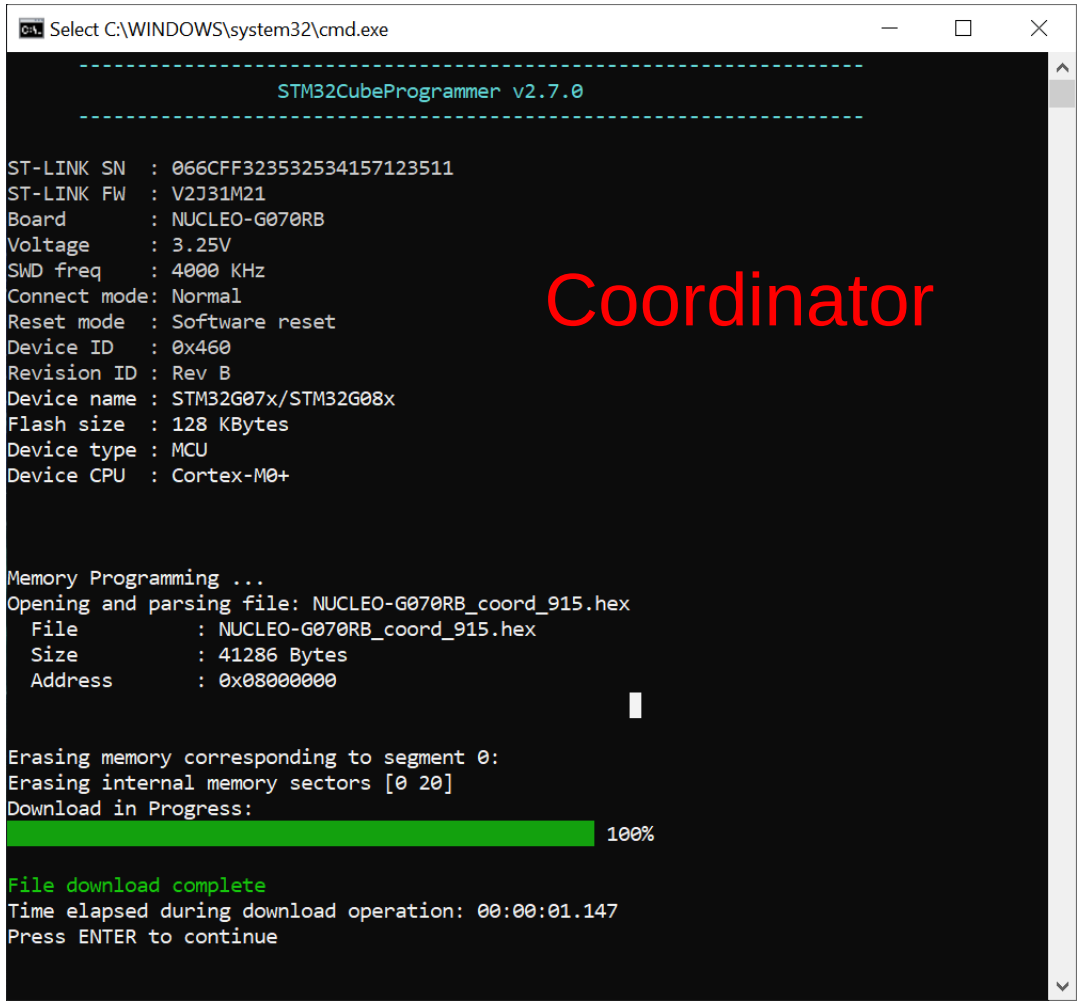
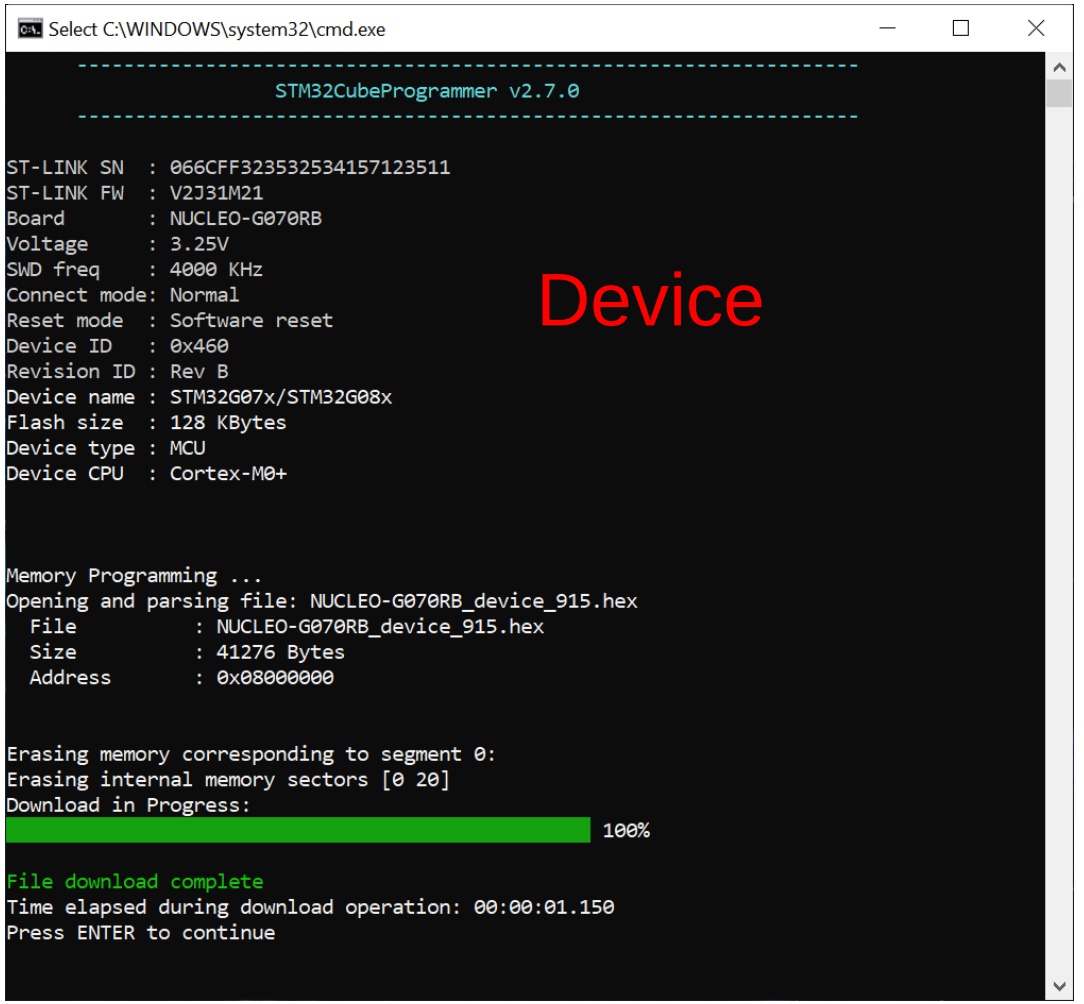
NUCLEO-G070RB FW upgrade (915 MHz)





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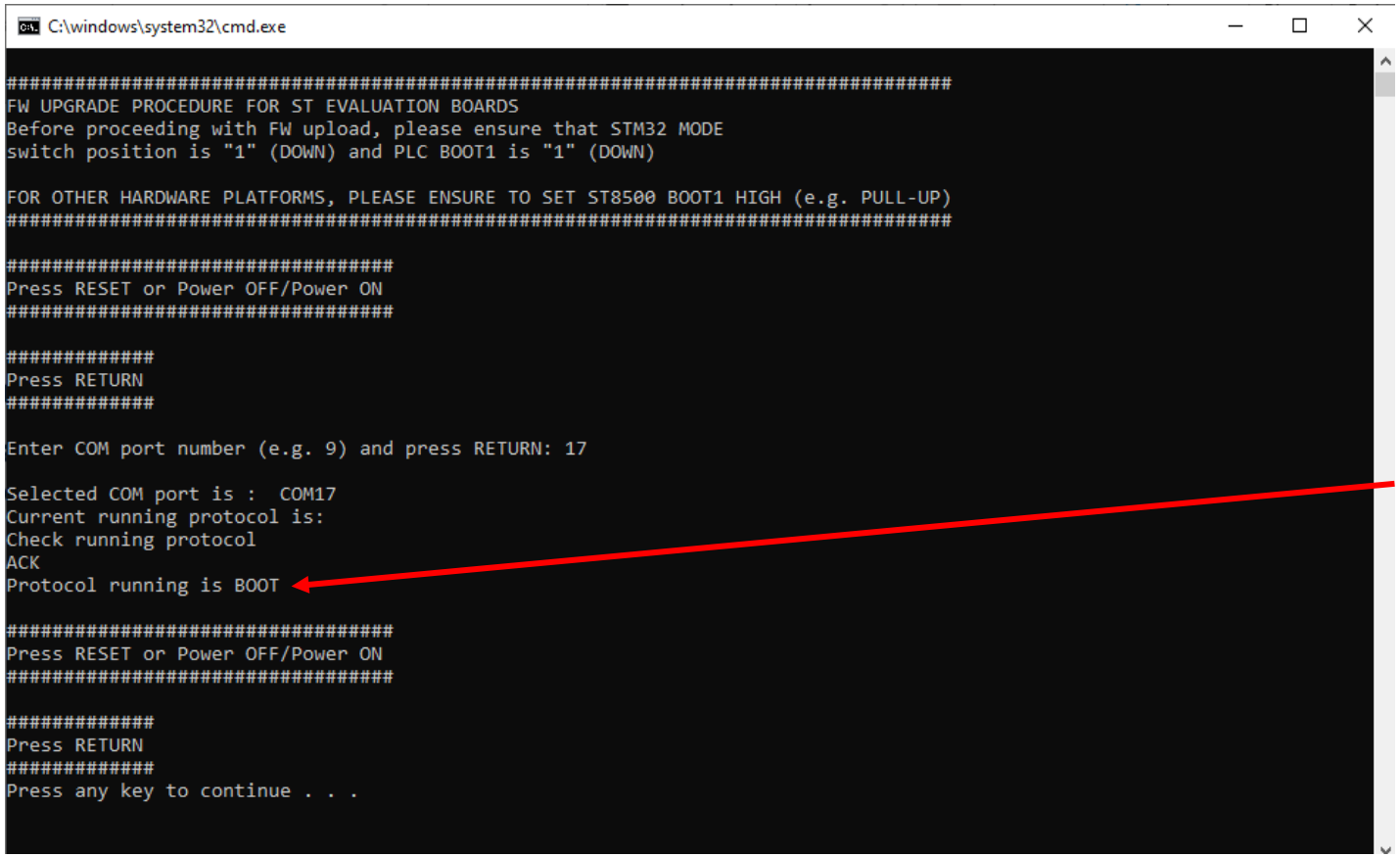
ST8500 FW upgrade steps

- Launch *ST8500_G3_Hybrid_PE_RTE_upload.bat* file and follow the instructions



Running protocol is BOOT if ST8500 SPI flash is empty

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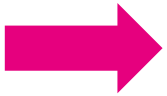
ST8500 FW upgrade steps

- *ST8500_SPI_Loader.img* file upload on ST8500 RAM
- After completion, FW images are written into ST8500 SPI flash

```
Upload on ST8500 RAM a boot software on-going...
ACK
True
ACK
BOOT Version read:True
Loading IMG Header
ACK
Header OK... start sending file
ACK
Done Write 2.8%
ACK
Done Write 5.4%
ACK
Done Write 8.0%
ACK
Done Write 10.6%
ACK
Done Write 13.2%
ACK
Done Write 15.7%
ACK
Done Write 18.3%
ACK
Done Write 20.9%
```



```
Done Write 82.9%
ACK
Done Write 85.5%
ACK
Done Write 88.1%
ACK
Done Write 90.6%
ACK
Done Write 93.2%
ACK
Done Write 95.8%
ACK
Done Write 98.4%
ACK
Done Write 100.0%
PE IMG File Loaded: imgs\ST8500_SPI_Loader.img
Send IMG Start Request
ACK
START DONE
Press any key to continue . . .
```

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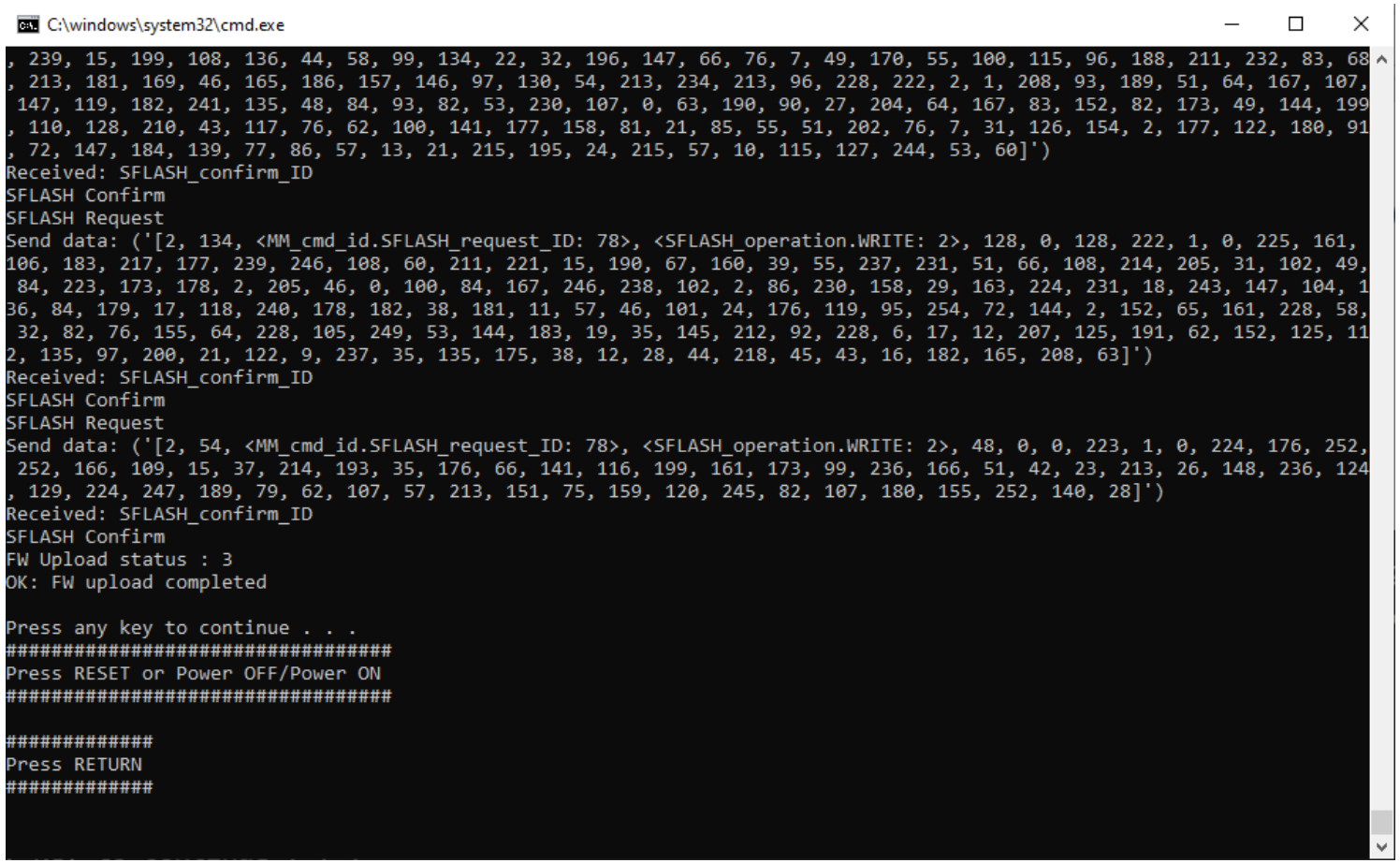
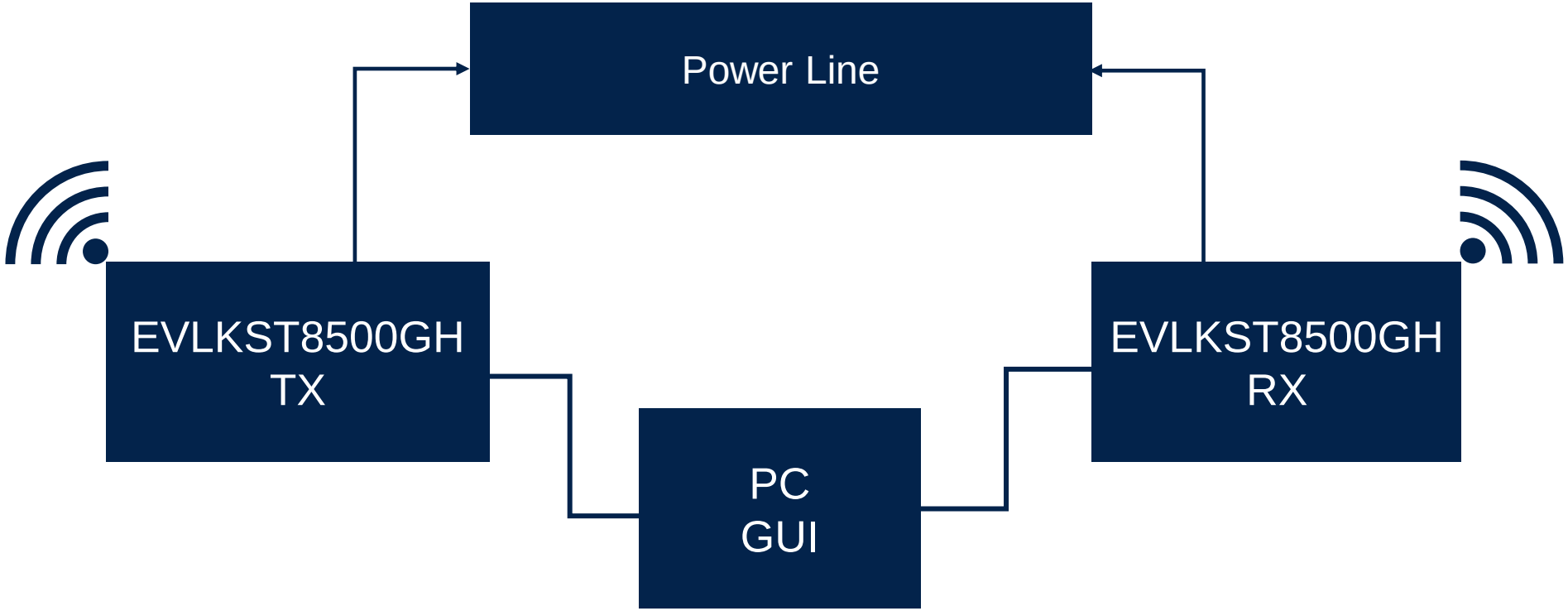
ST8500 FW upgrade steps

- Write of FW images into ST8500 SPI flash (final part and program termination)
- After RESET, the ST8500 is ready for test with G3 GUI



Communication Test setup

- Basic setup with two nodes

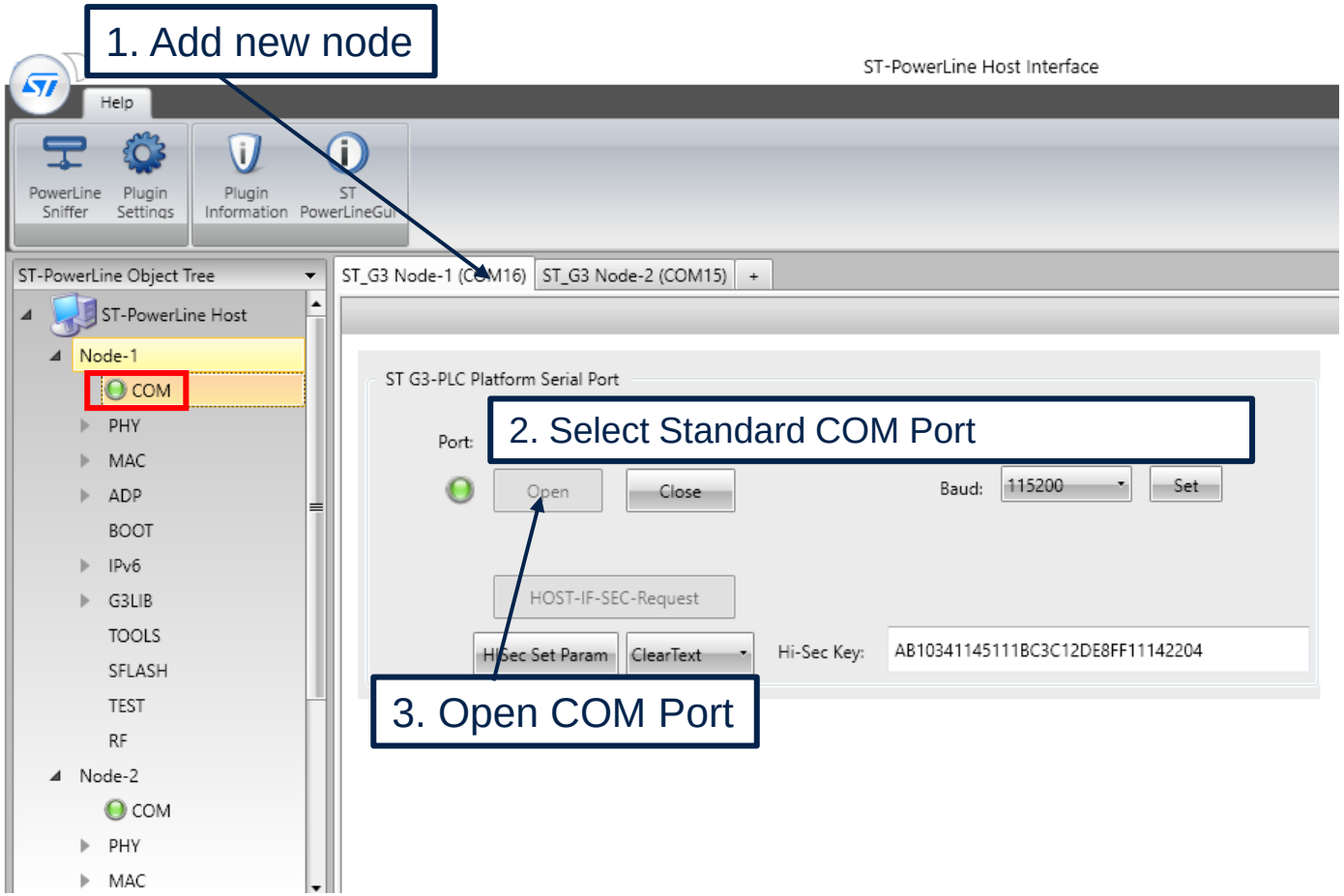


PHY communication tests

Communication setup steps

1. Open G3 GUI: unzip archive and launch *StPowerLineGui.exe* file
2. Add two new nodes and open the UART connection (Standard COM port)
3. Initialize and configure TX and RX nodes
4. Basic TX and RX test
5. Automated data rate TX and RX test with statistics

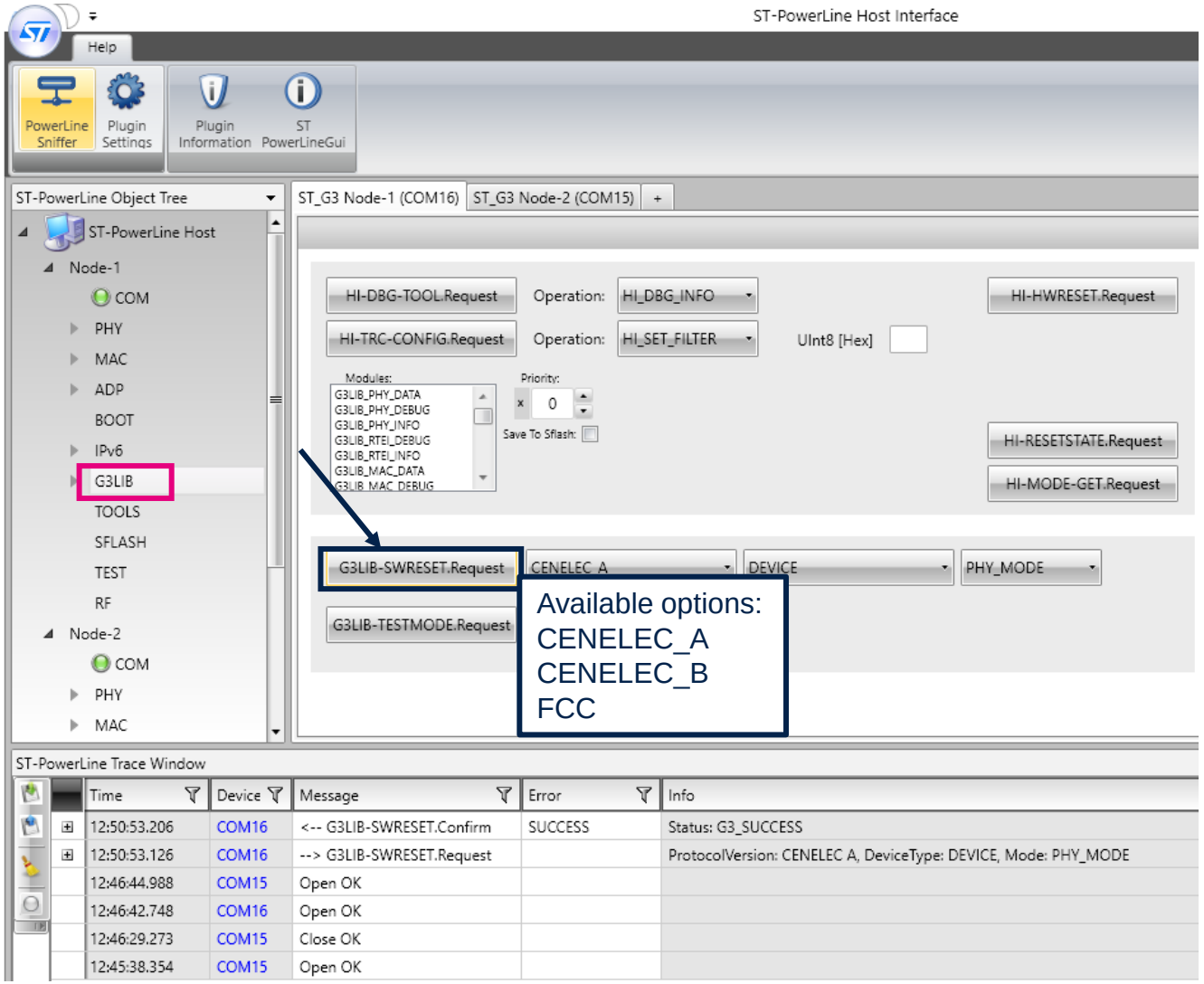
G3 GUI – UART connection



Note: you need to create at least 2 nodes for communication test

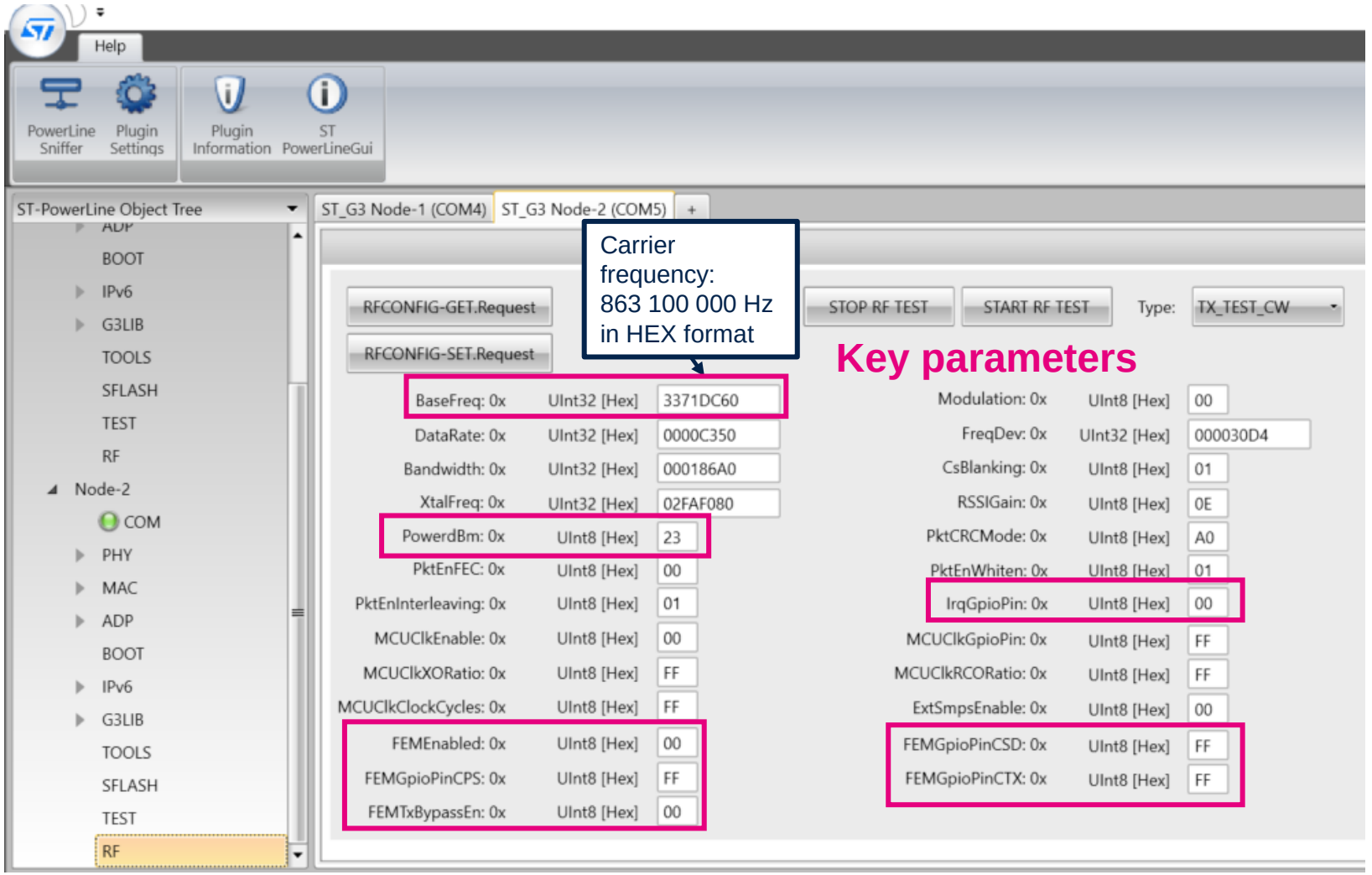
G3 GUI – G3-PLC node initialization

- Repeat the same step for each node



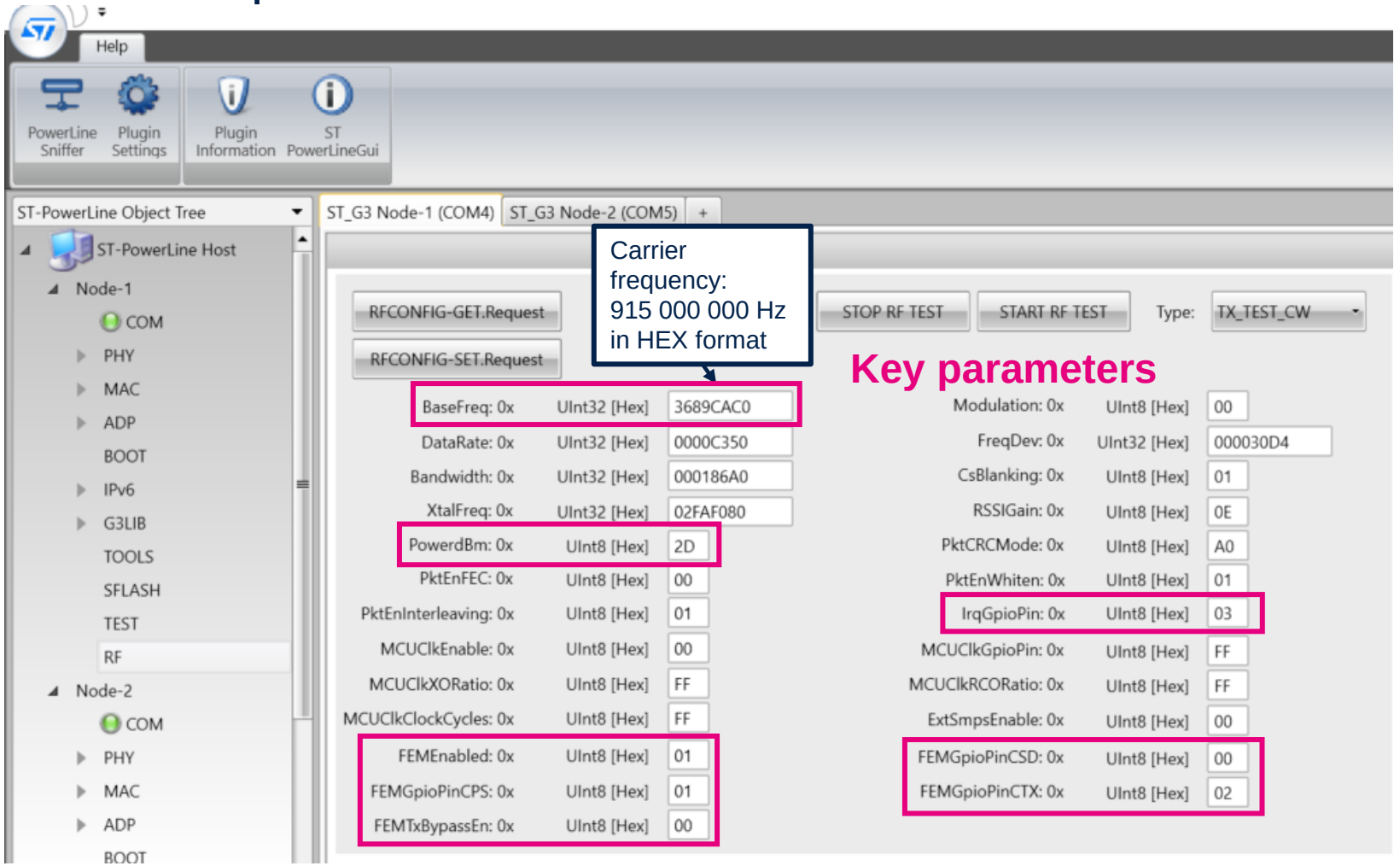
G3 GUI – RF configuration for EVLKST8500GH868

- Repeat the same step for each node

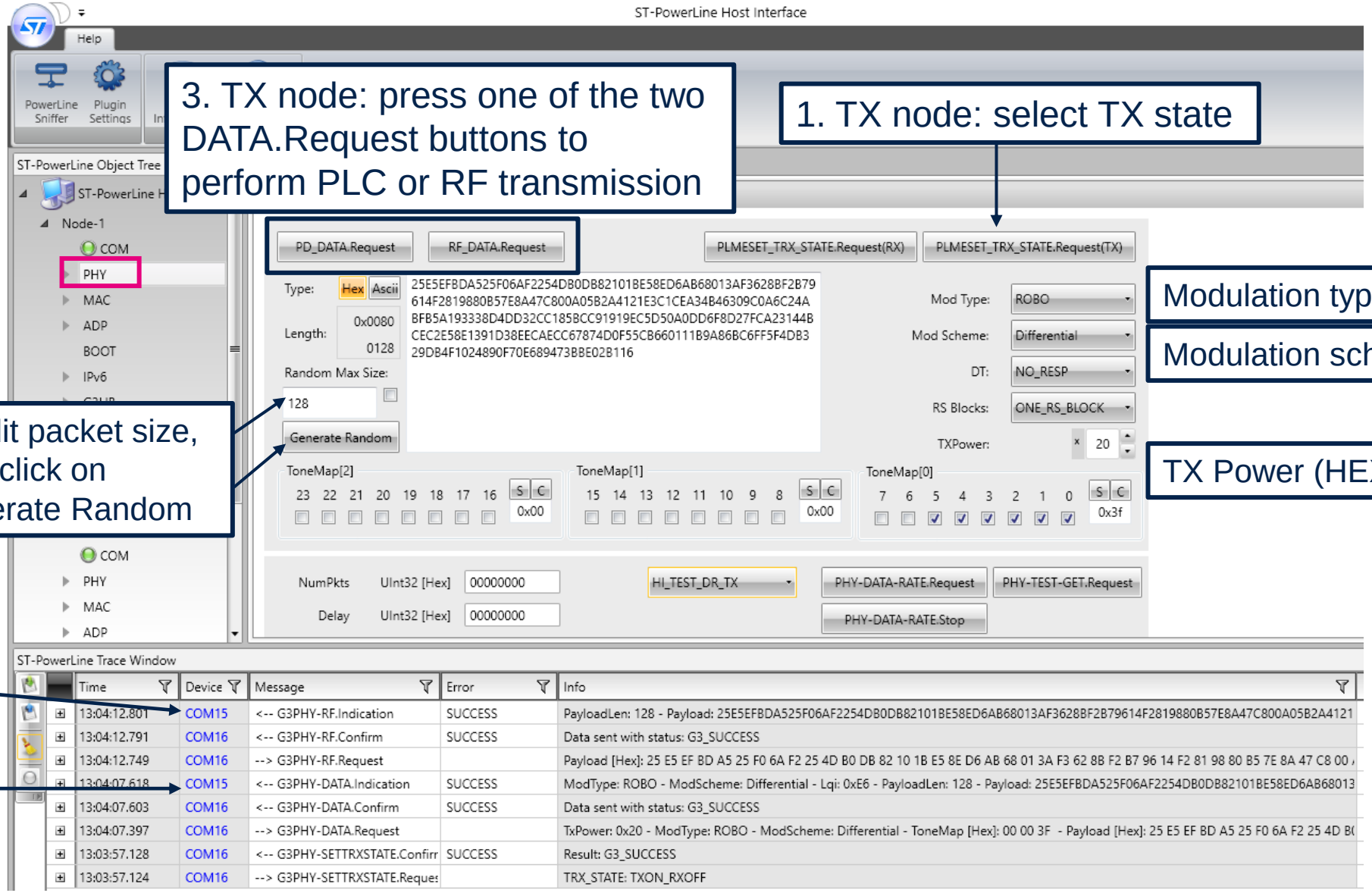


G3 GUI – RF configuration for EVLKST8500GH915

- Repeat the same step for each node



G3 GUI – PHY TX settings and basic test



3. TX node: press one of the two DATA.Request buttons to perform PLC or RF transmission

1. TX node: select TX state

Modulation type

Modulation scheme

TX Power (HEX)

2. Edit packet size, then click on Generate Random

RF DATA.Indication from RX node

PLC DATA.Indication from RX node

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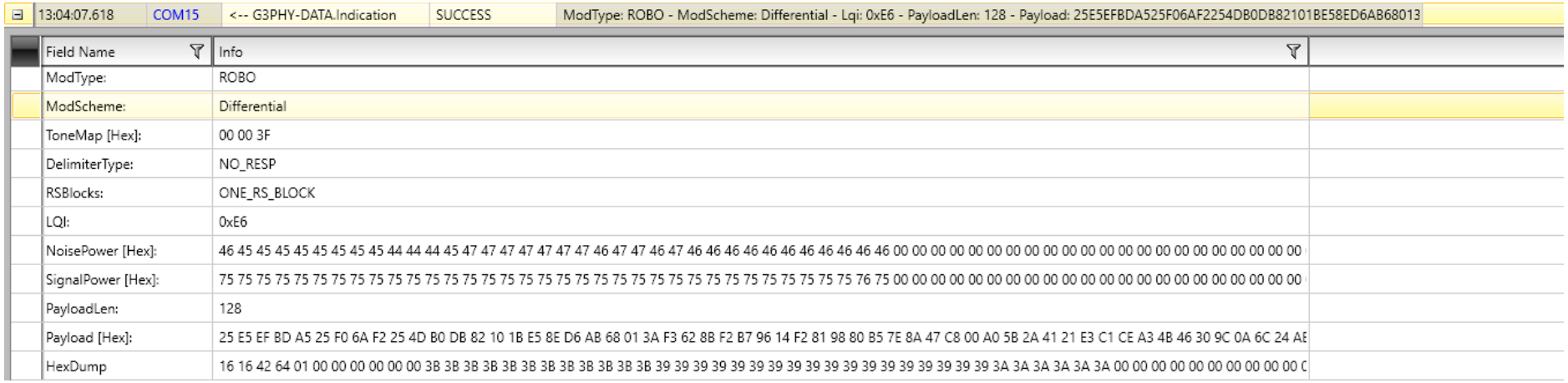
G3 GUI – PHY DATA.Indication from RX node

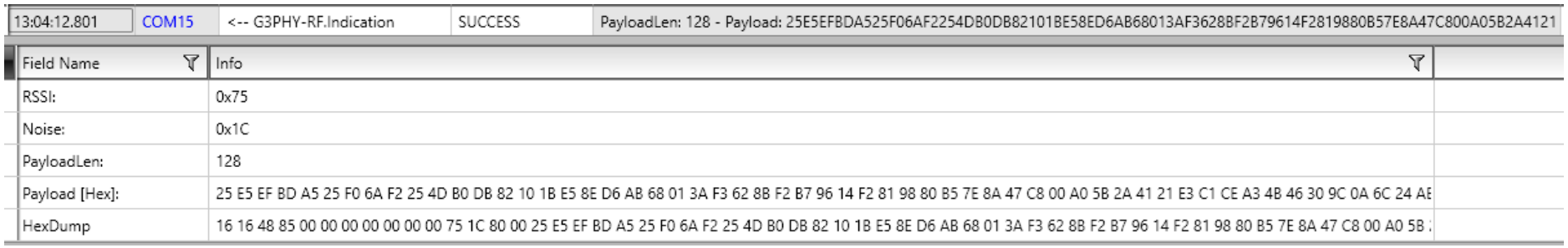
- PLC PHY DATA.Indication details



13:04:07.618	COM15	<-- G3PHY-DATA.Indication	SUCCESS	ModType: ROBO - ModScheme: Differential - Lqi: 0xE6 - PayloadLen: 128 - Payload: 25E5EFBDA525F06AF2254DB0DB82101BE58ED6AB68013

Field Name	Info
ModType:	ROBO
ModScheme:	Differential
ToneMap [Hex]:	00 00 3F
DelimiterType:	NO_RESP
RSBlocks:	ONE_RS_BLOCK
LQI:	0xE6
NoisePower [Hex]:	46 45 45 45 45 45 45 45 45 44 44 44 45 47 47 47 47 47 47 47 46 47 47 46 47 46 46 46 46 46 46 46 46 46 46 46 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
SignalPower [Hex]:	75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 76 75 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PayloadLen:	128
Payload [Hex]:	25 E5 EF BD A5 25 F0 6A F2 25 4D B0 DB 82 10 1B E5 8E D6 AB 68 01 3A F3 62 8B F2 B7 96 14 F2 81 98 80 B5 7E 8A 47 C8 00 A0 5B 2A 41 21 E3 C1 CE A3 4B 46 30 9C 0A 6C 24 AE
HexDump	16 16 42 64 01 00 00 00 00 00 00 3B 3B 3B 3B 3B 3B 3B 3B 3B 3B 3B 3B 39 39 39 39 39 39 39 39 39 39 39 39 39 39 39 39 39 3A 3A 3A 3A 3A 3A 00 00 00 00 00 00 00 00 00 00 C

- RF PHY DATA.Indication details



13:04:12.801	COM15	<-- G3PHY-RF.Indication	SUCCESS	PayloadLen: 128 - Payload: 25E5EFBDA525F06AF2254DB0DB82101BE58ED6AB68013AF3628BF2B79614F2819880B57E8A47C800A05B2A4121

Field Name	Info
RSSI:	0x75
Noise:	0x1C
PayloadLen:	128
Payload [Hex]:	25 E5 EF BD A5 25 F0 6A F2 25 4D B0 DB 82 10 1B E5 8E D6 AB 68 01 3A F3 62 8B F2 B7 96 14 F2 81 98 80 B5 7E 8A 47 C8 00 A0 5B 2A 41 21 E3 C1 CE A3 4B 46 30 9C 0A 6C 24 AE
HexDump	16 16 48 85 00 00 00 00 00 00 00 75 1C 80 00 25 E5 EF BD A5 25 F0 6A F2 25 4D B0 DB 82 10 1B E5 8E D6 AB 68 01 3A F3 62 8B F2 B7 96 14 F2 81 98 80 B5 7E 8A 47 C8 00 A0 5B

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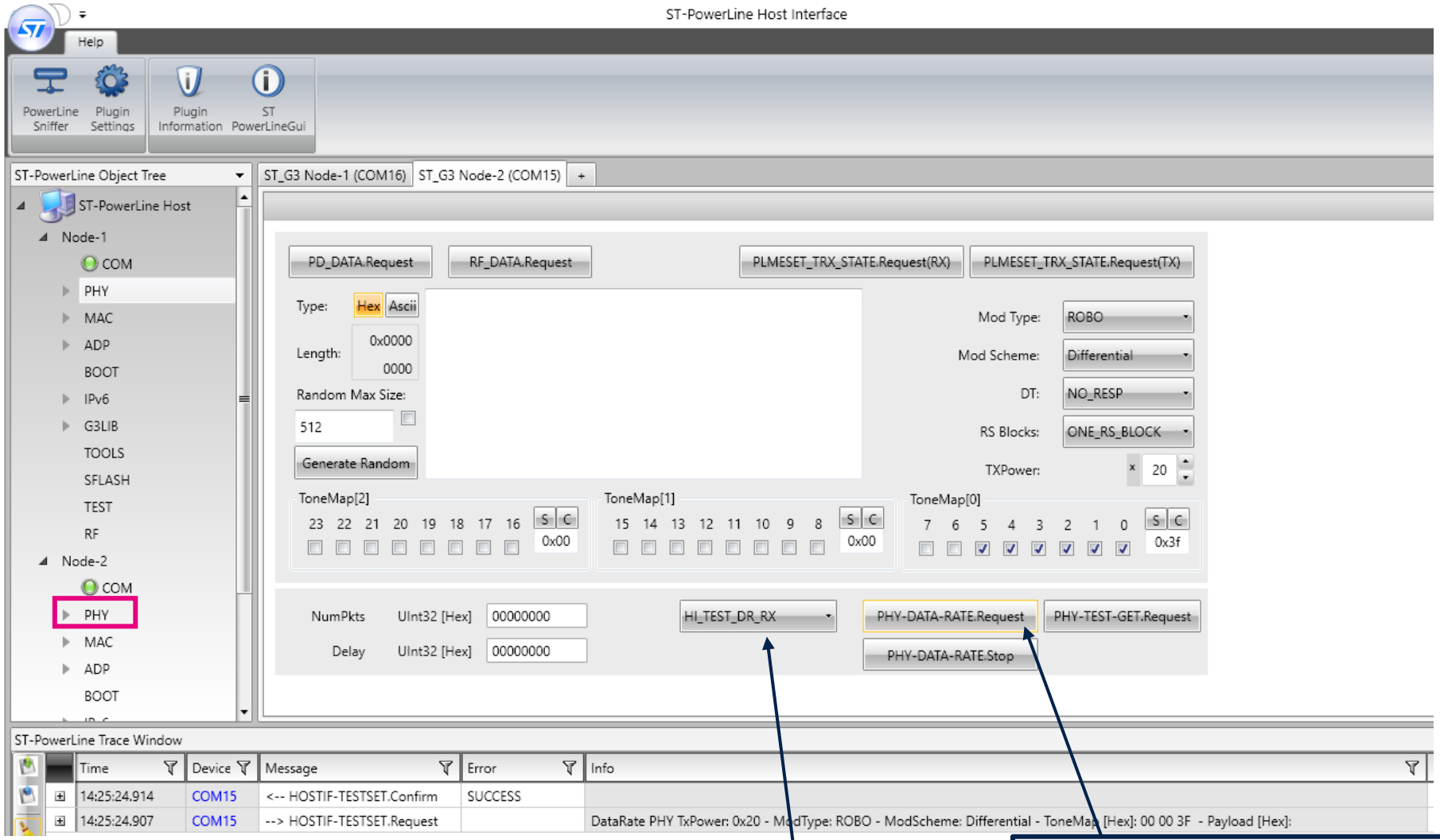
G3 GUI – automated data rate RX start



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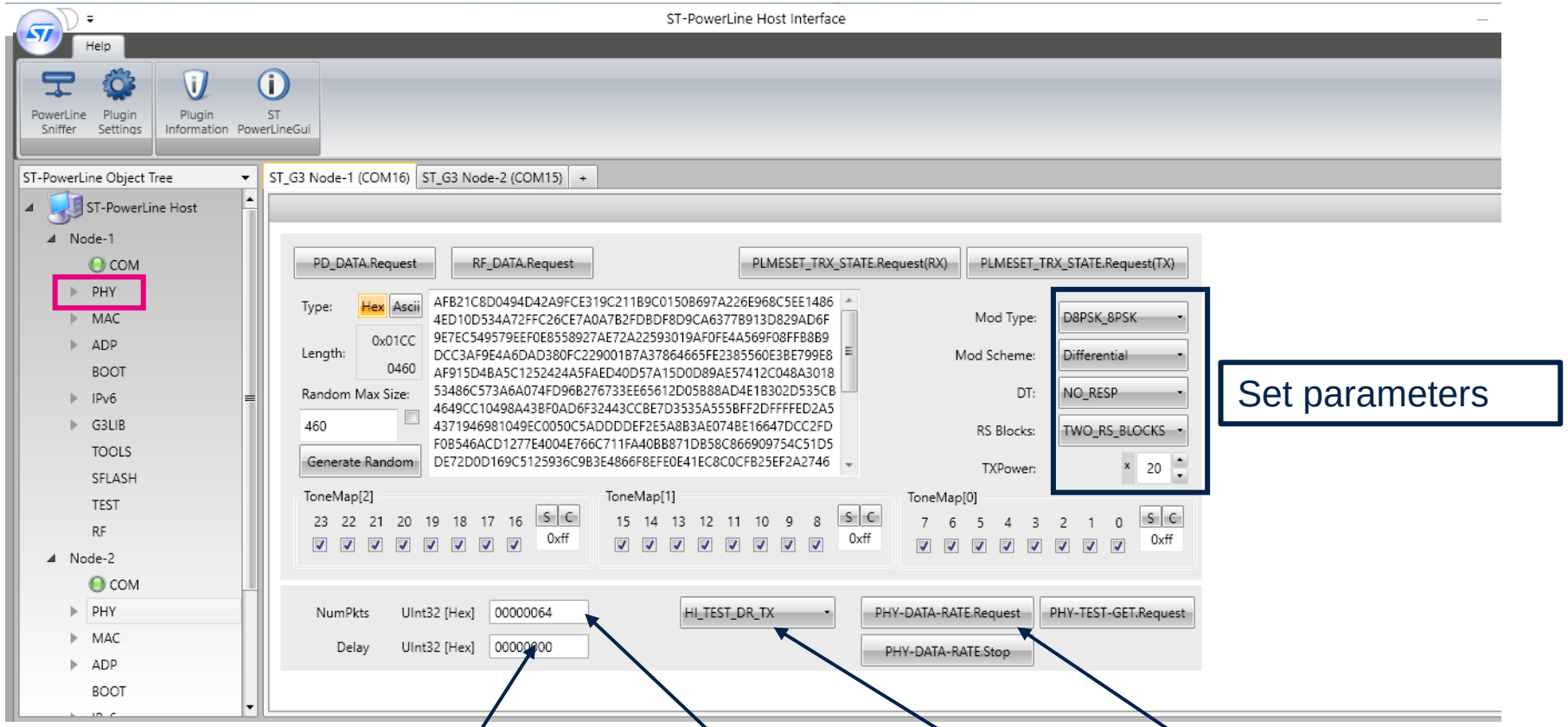
G3 GUI – automated data rate TX test



Set parameters

Inter-packet delay [ms] in HEX format

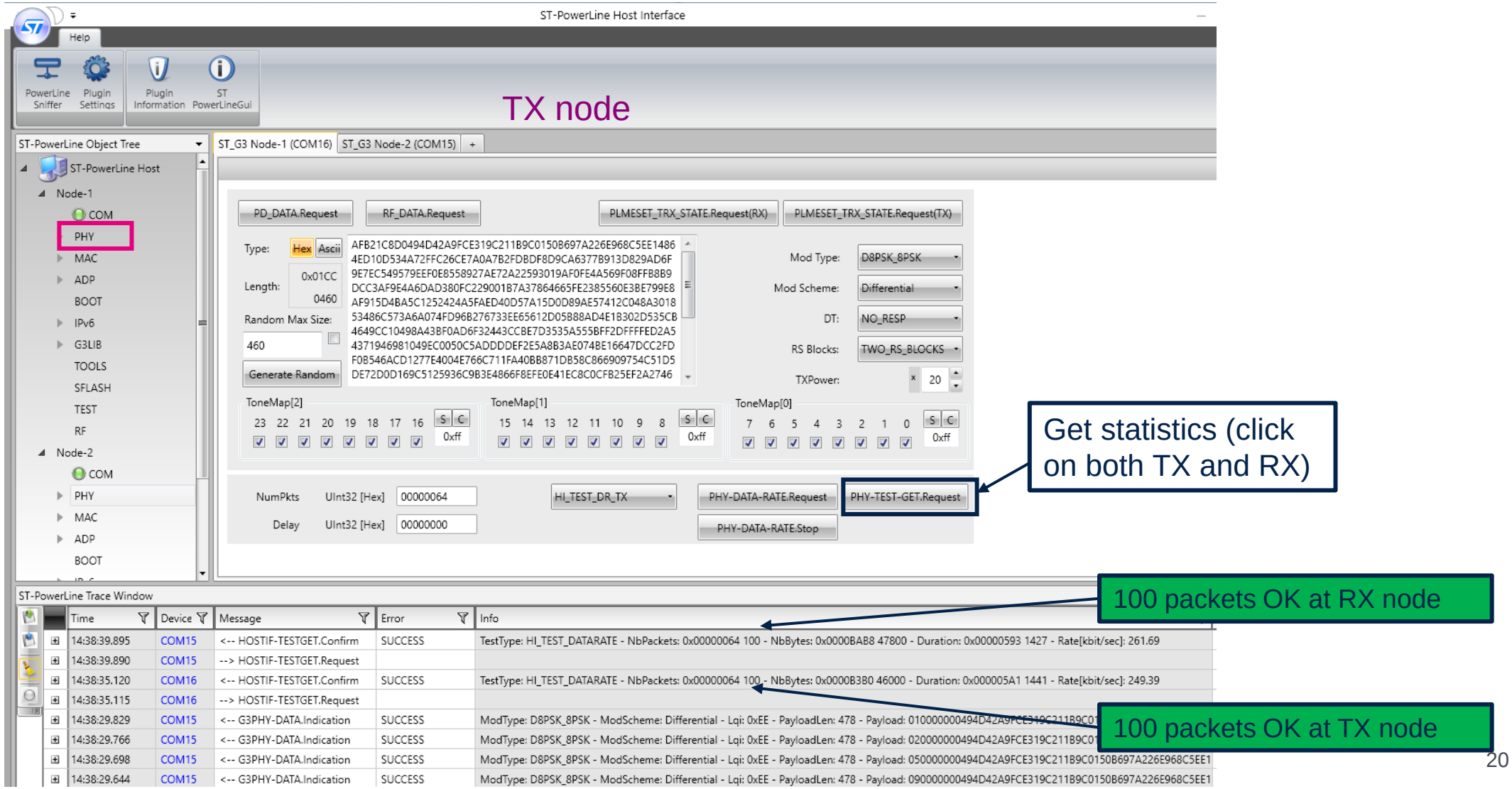
Packet number in HEX format (0x64 = 100)

TX mode

Start transmission

G3 GUI – statistics

- Once the transmission has finished, you can see the statistics related to TX and RX packets



IPv6 communication tests

Communication setup steps

1. Open G3 GUI: unzip archive and launch *StPowerLineGui.exe* file
2. Add two new nodes and open the UART connection (Standard COM port)
3. Initialize and configure TX and RX nodes
4. Set one node as COORD and the other as DEVICE in IPv6_BOOT_MODE.

(Note that it's preferrable to configure the Coordinator first for faster Join procedure)

5. Get MAC short address for both COORD and DEVICE
6. Configure UDP unicast connection for both COORD and DEVICE
7. Test communication from COORD to DEVICE
8. Test communication from DEVICE to COORD

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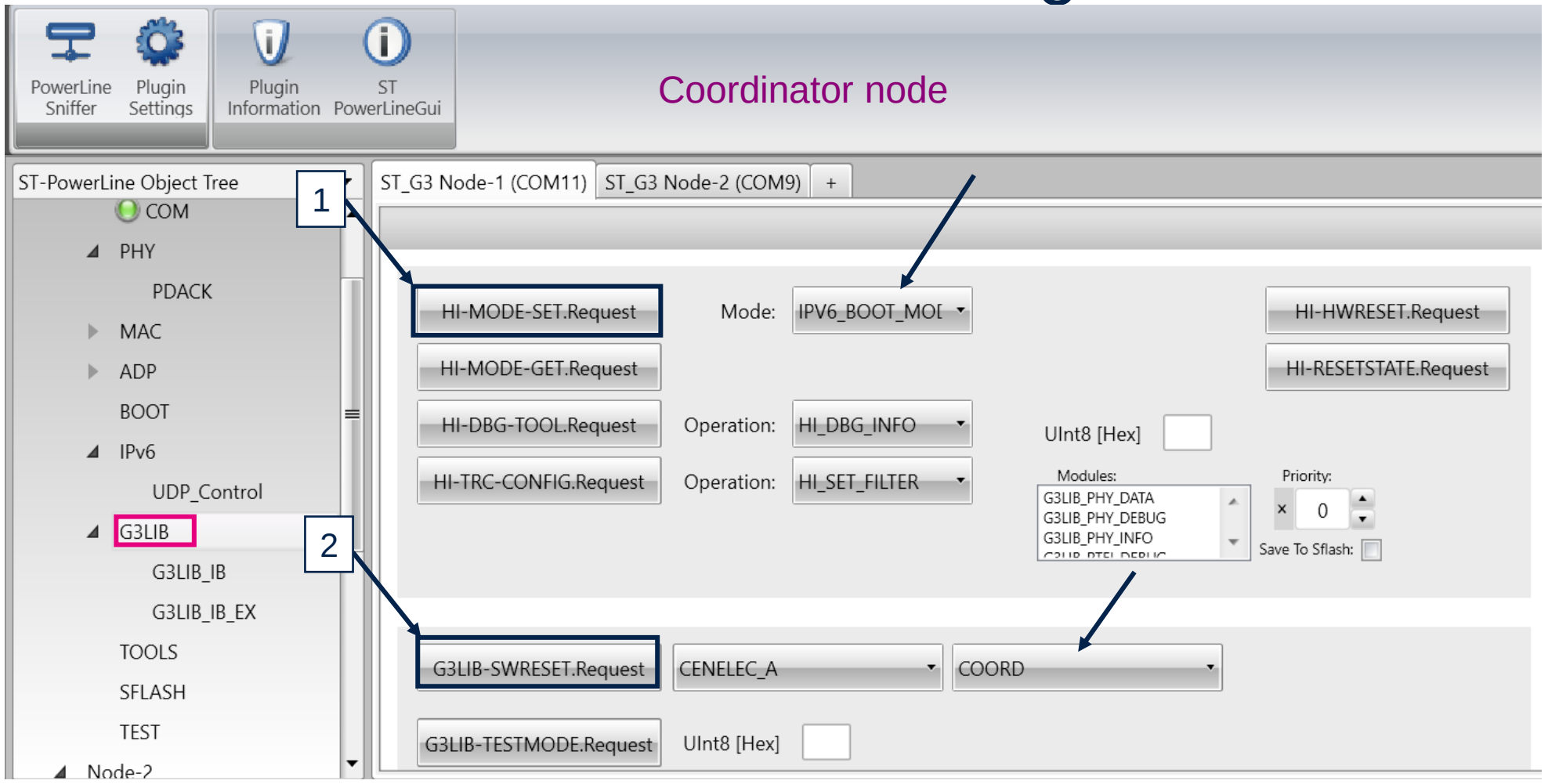
IPv6 boot mode configuration: Coordinator



13:05:13.431	COM11	<-- G3BOOT-SRV-START.Confirm	SUCCESS	Status: G3_SUCCESS
13:04:53.374	COM11	<-- G3LIB-SWRESET.Confirm	SUCCESS	Status: G3_SUCCESS
13:04:51.958	COM11	--> G3LIB-SWRESET.Request		ProtocolVersion: CENELEC A, DeviceType: COORD
13:04:40.381	COM11	<-- HOSTIF-MODESET.Confirm	SUCCESS	
13:04:40.349	COM11	--> HOSTIF-MODESET.Request		IPV6_BOOT_MODE

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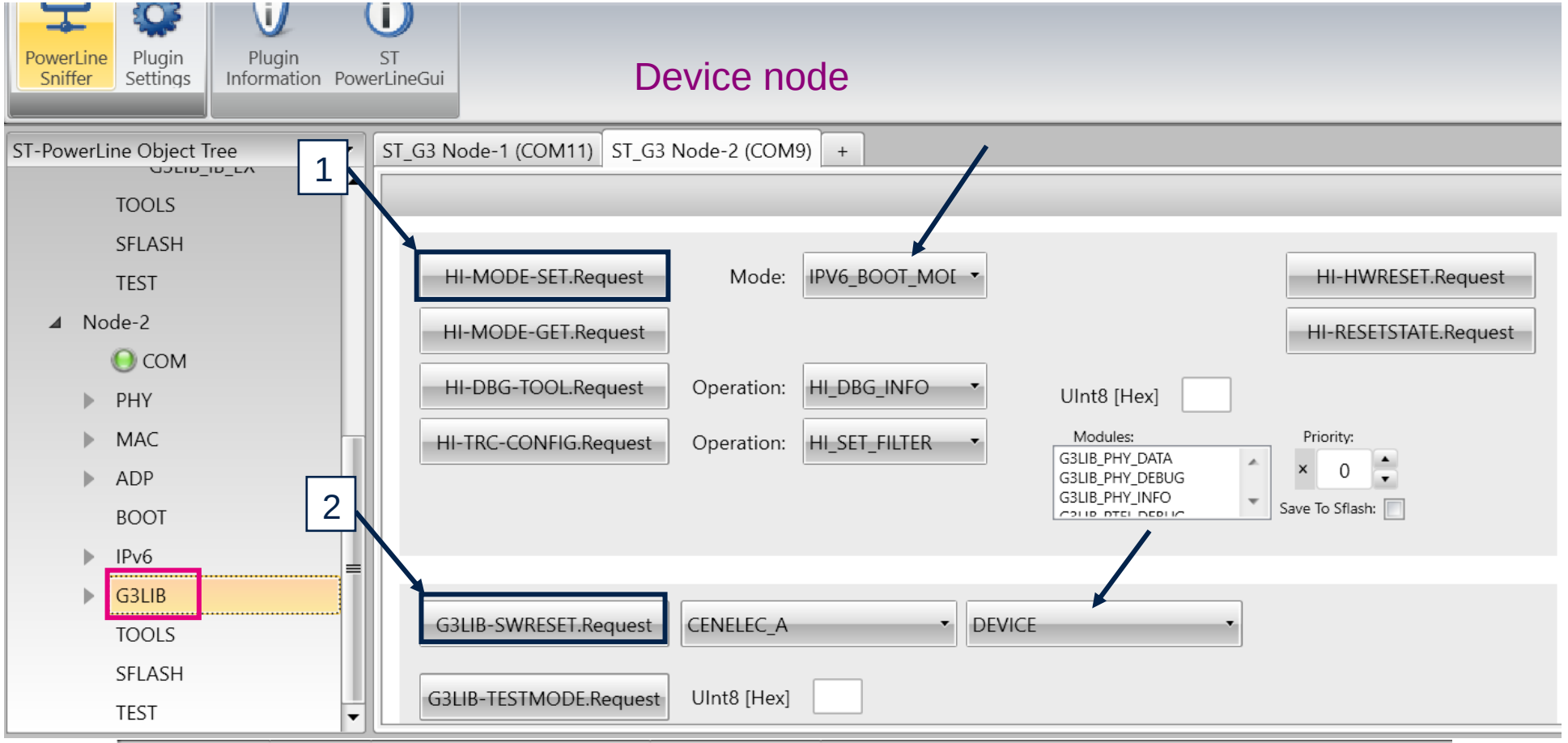
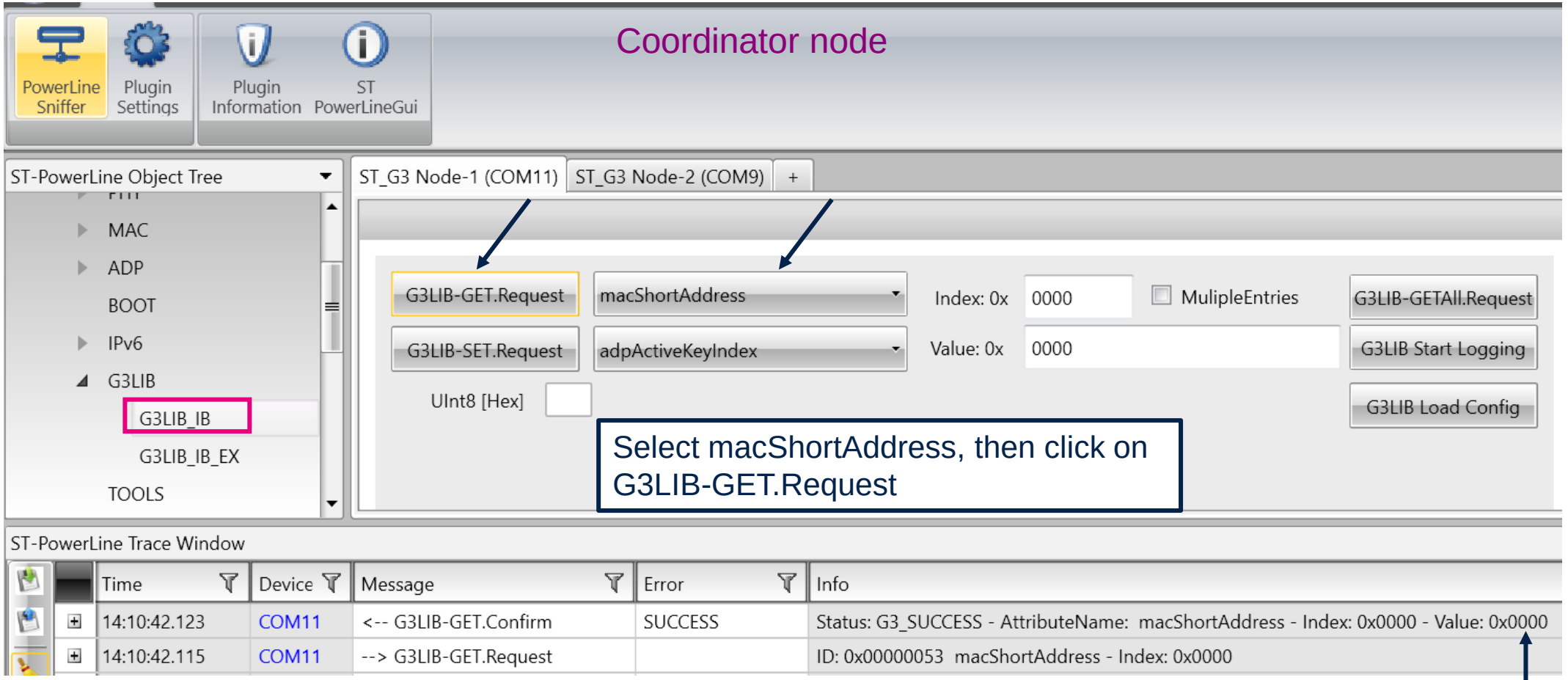
IPv6 boot mode configuration: Device



13:07:44.847	COM9	<-- G3BOOT-DEV-START.Confirm	SUCCESS	Status: G3_SUCCESS - NetworkAddress: 0x0002 - PANId: 0x781D
13:07:44.743	COM11	<-- G3BOOT-SRV-JOIN.Indicatio	SUCCESS	ExtendedAddress: 0x0080E1FFFE4BA618 - ShortAddress: 0x0002
13:07:43.391	COM11	<-- G3BOOT-SRV-GETPSK.Indica	SUCCESS	ExtendedAddress: 0x0080E1FFFE4BA618 - IdP: 0x0080E1FFFE4BA618
13:07:39.977	COM9	<-- G3BOOT-DEV-PANSORT.Indi	SUCCESS	PANCount: 1
13:07:19.919	COM9	<-- G3LIB-SWRESET.Confirm	SUCCESS	Status: G3_SUCCESS
13:07:19.891	COM9	--> G3LIB-SWRESET.Request		ProtocolVersion: CENELEC A, DeviceType: DEVICE
13:07:14.690	COM9	<-- HOSTIF-MODESET.Confirm	SUCCESS	
13:07:14.676	COM9	--> HOSTIF-MODESET.Request		IPV6_BOOT_MODE

MAC short address: Coordinator



Coordinator MAC short address

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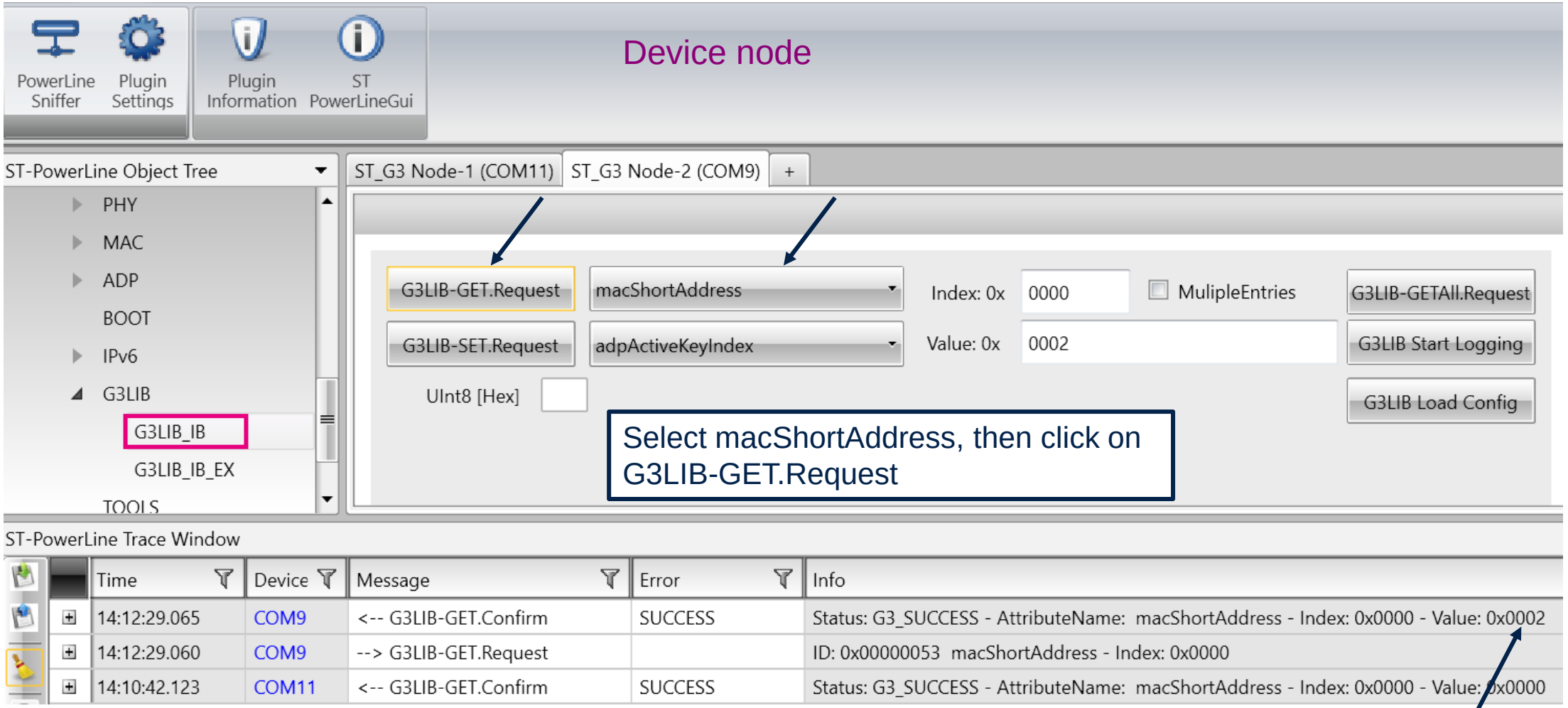
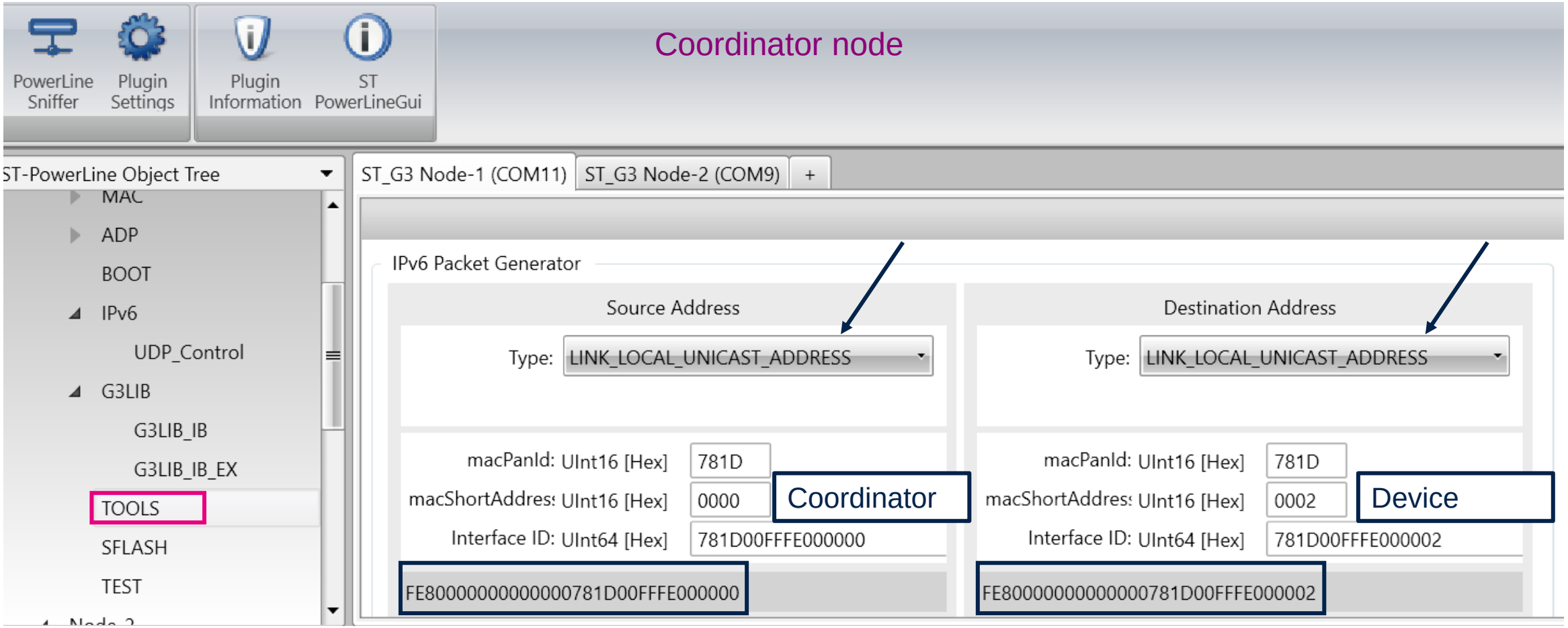
MAC short address: Device



Unicast connection settings: Coordinator



Remote Address for Device, to be copied into the related UDP_Control menu (Node-2)

Remote Address for Coordinator, to be copied into the related UDP_Control menu (Node-1)

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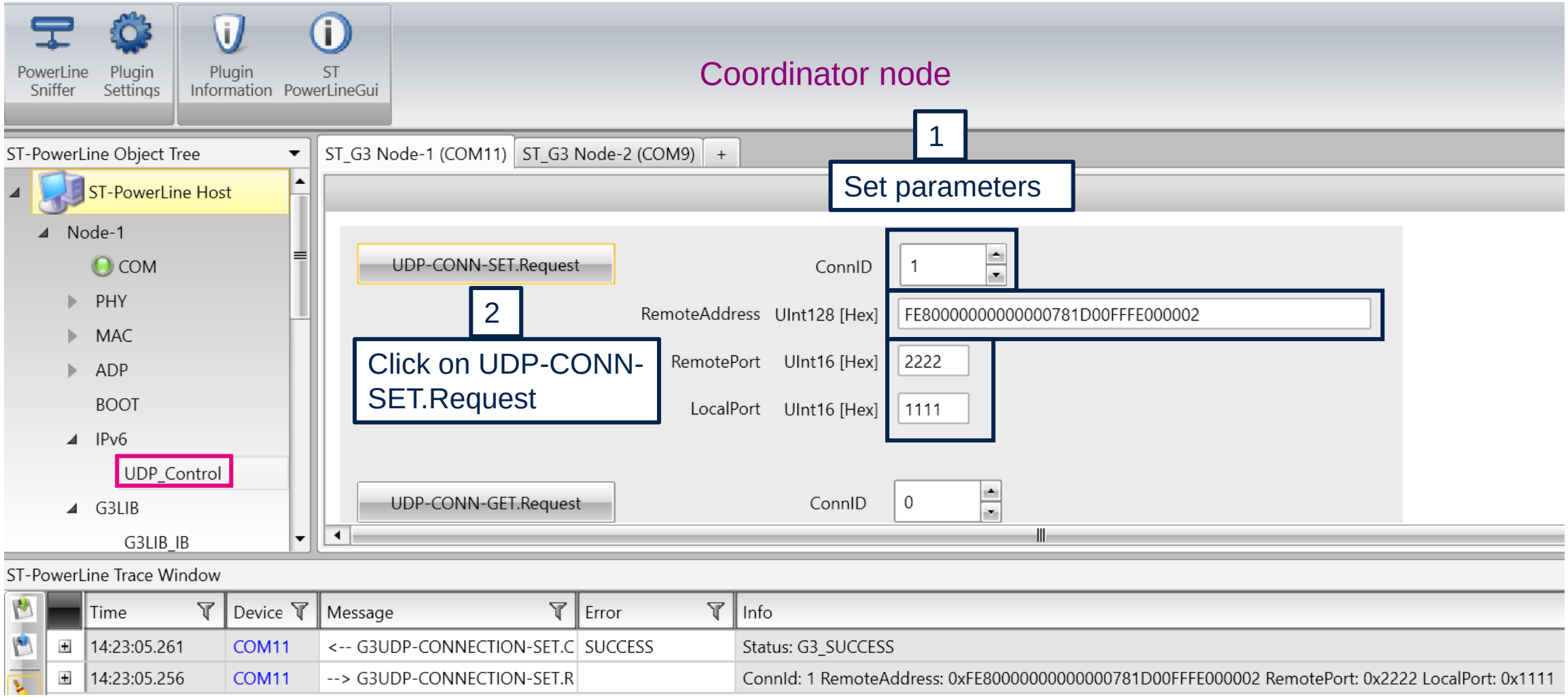
UDP settings: Coordinator



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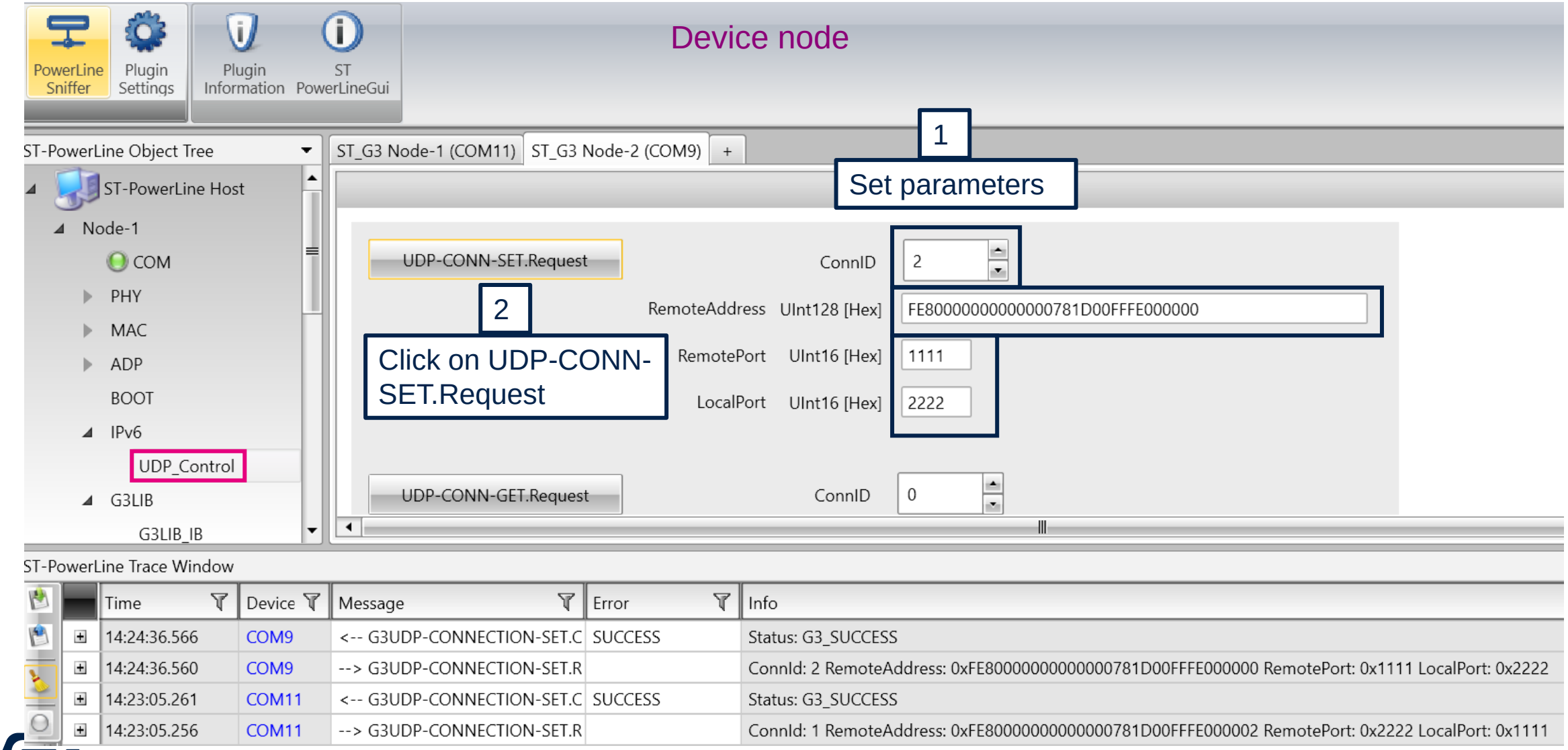
UDP settings: Device



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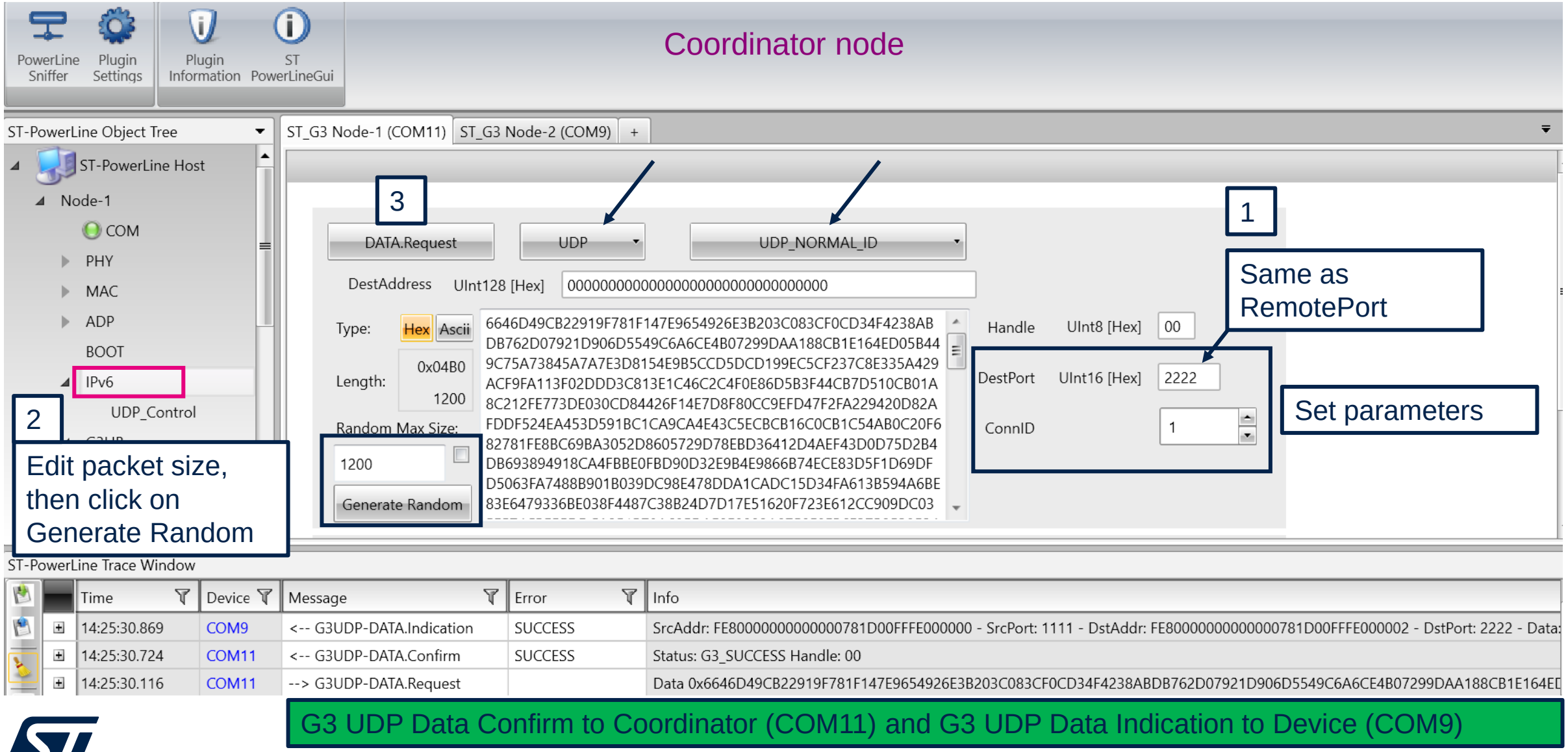
Coordinator vs Device



G3 UDP Data Confirm to Coordinator (COM11) and G3 UDP Data Indication to Device (COM9)

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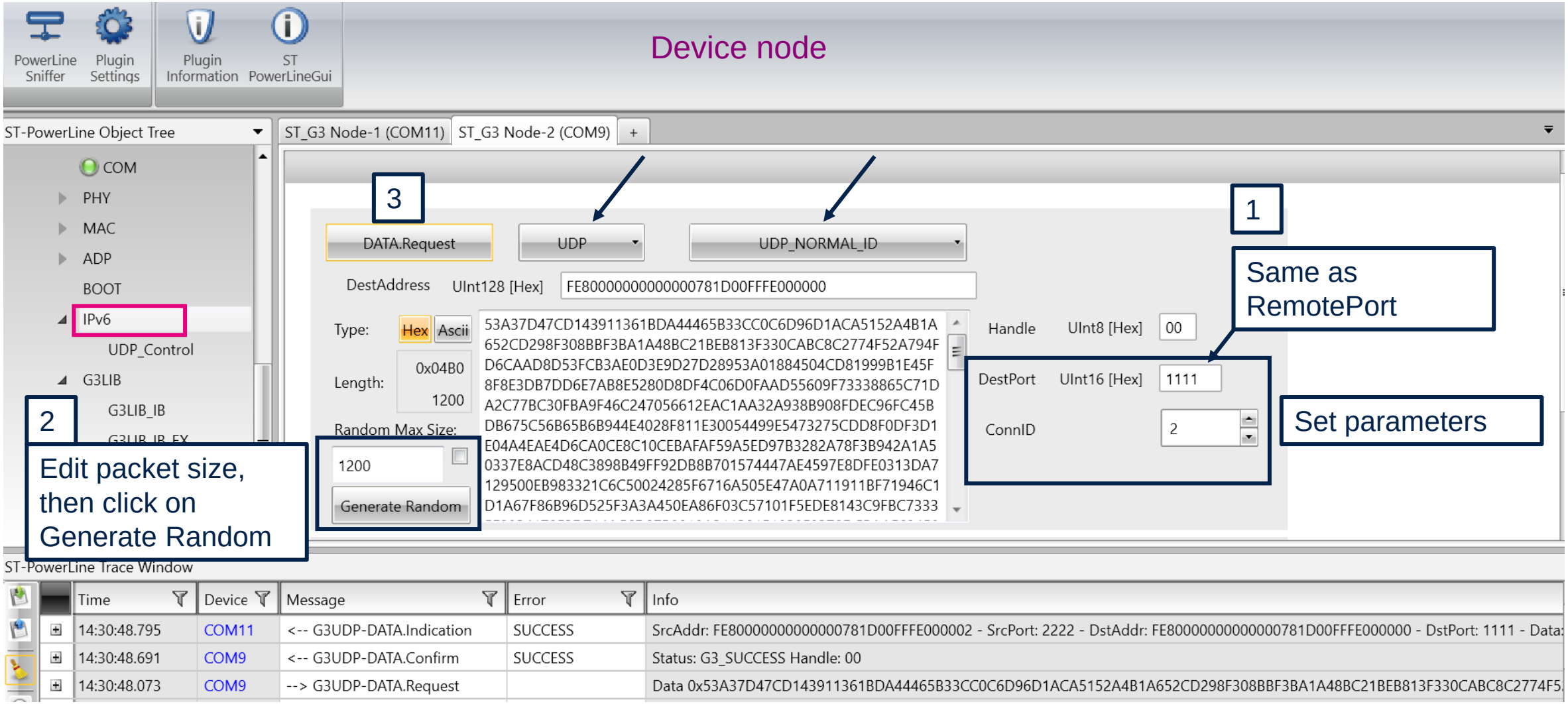
Device vs Coordinator



G3 UDP Data Confirm to Device (COM9) and G3 UDP Data Indication to Coordinator (COM11)

Thank you

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