G3 Host Message Example

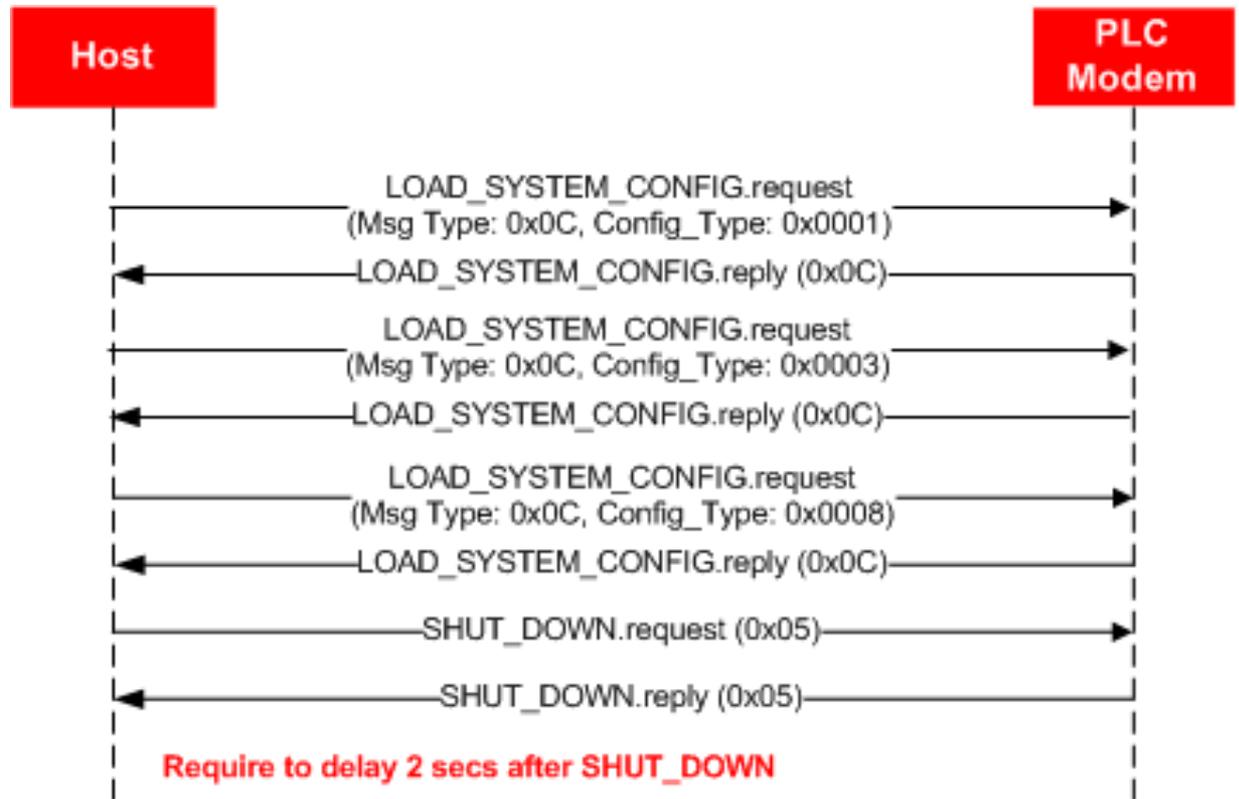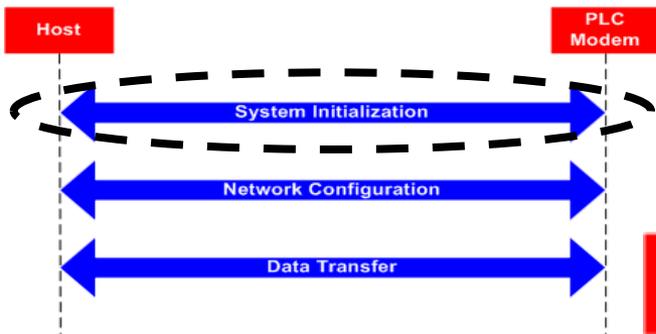**www.ti.com/smartgrid**

TEXAS
INSTRUMENTS

Agenda

- **Overview**
- **System Initialization**
- **Network Configuration**
- **Data Transfer**
- **UDP Data Example**
- **IPv6 Address Mapping (Unicast/Multicast/Broadcast)**

TEXAS INSTRUMENTS

Message Flow Overview
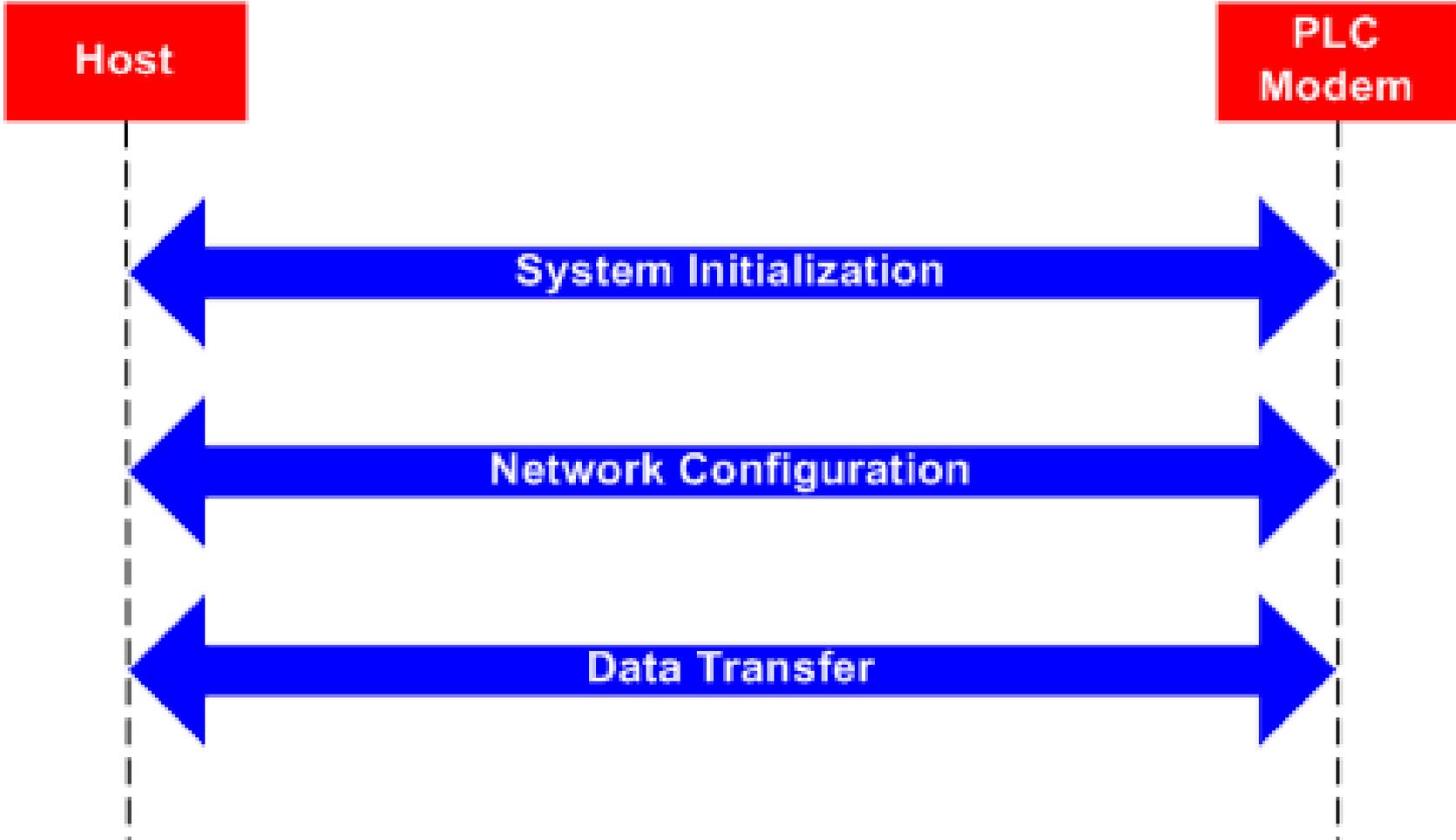
System Initialization (1/3)

System Initialization (2/3)

- **LOAD_SYSTEM_CONFIG (Port configuration)**

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
2	Config Type								**0x0001 (port configuration)**
2	Config Length								**0x0001**
1	Reserved			Diag Port		Host Port			**0x00 (SCI-A) for both Diag/Host**

- **LOAD_SYSTEM_CONFIG (System Configuration)**

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
	Config Type								**0X0003 (system configuration)**
	Config Length								**0x001A**
2	Reserved								
16	Reserved								
6	Reserved								
1	Device Mode								**0x0000 (G3 normal mode)**
1			Auto Mode						**Auto Mode: 0 (non-Auto Mode)**

System Initialization (3/3)

- **LOAD_SYSTEM_CONFIG (G3 Configuration)**

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
	Config Type								0X0008 (G3 configuration)
	Config Length								0x0010 (16 bytes)
1							COH	TMR	0x00 (set flags to zero) or 0X01 (TMR on)
1	Reserved								0x00
8	G3 Long Address								Unique device long address
4	Reserved								0x00000000
2	Reserved								0x0000

- **SHUT_DOWN**

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
2	Reset Type								0x0000 (Soft Reset)

Network Configuration (1/3)
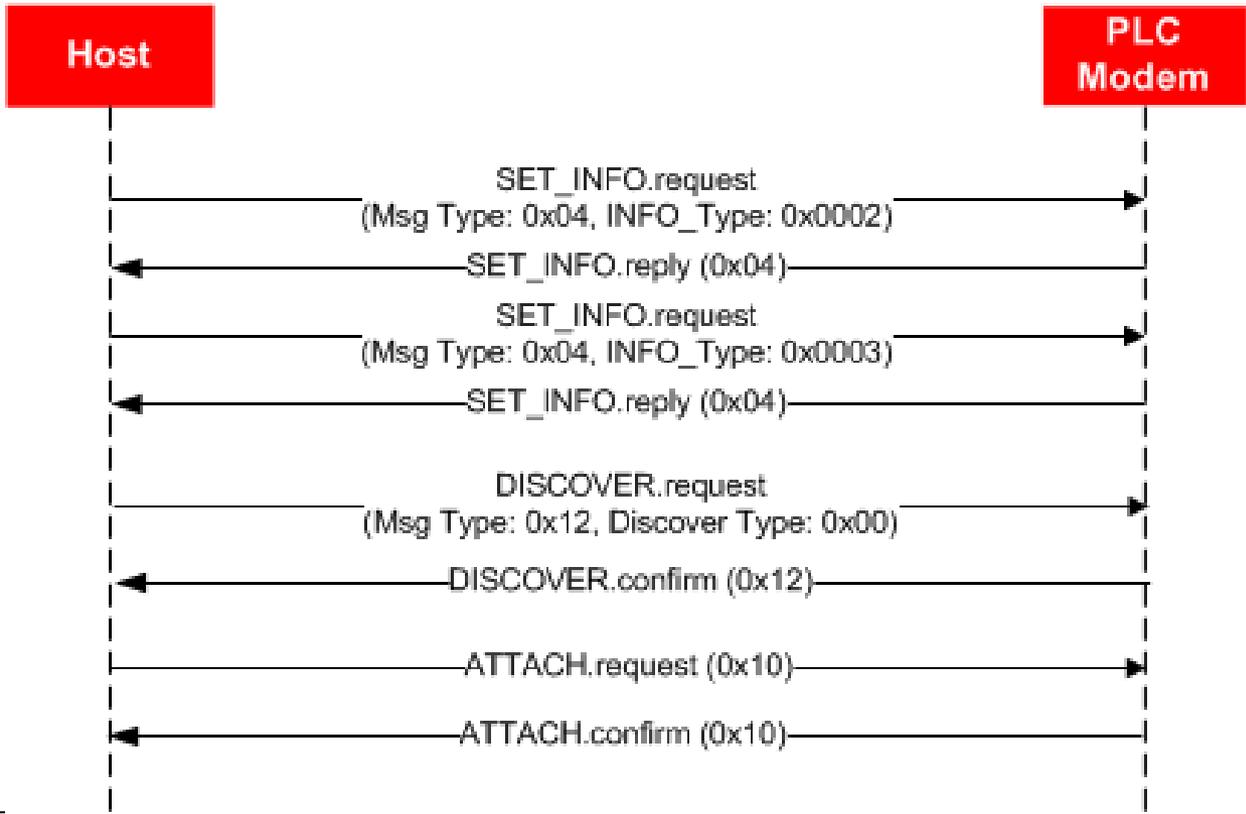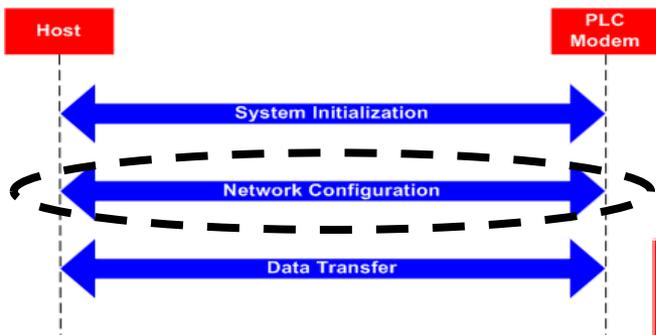
- ## SET_INFO (G3 TX PHY Parameters)

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
2	INFO Type								**0X0002 (G3 TX PHY Parameters)**
2	INFO Length								**0x0012 (18-byte)**
1		Band Sel			COH			TMR	**Depending on Band plan, need to set PHY parameters. Refer to Host Spec. (For Cenelec band, Band Sel=0)**
1	Reserved					Modulation			
2	TX Level								
14	Tone Mask								

- ## SET_INFO (G3 RX PHY Parameters)

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
2	INFO Type								**0X0003 (G3 RX PHY Parameters)**
2	INFO Length								**0x0012 (18-byte)**
1	Reserved								**Depending on Band plan, need to set PHY parameters. Refer to Host Spec. NOTE that Band Sel and Tone Mask should be the same as TX parameters. Set AGC to 1.**
1		Band Sel			COH	BLI		AGC	
2	Gain Value								
14	Tone Mask								

Network Configuration (3/3)

- ## DISCOVER

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
1	Discover Type								**0x00 (Network Discover)**
1	Duration								**0x05 (5 seconds: recommend)**

- ## ATTACH

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
2	PAN ID								**PAN ID to be attached (The host needs to choose a PAN ID from a list of PAN IDs in Network Discover.confirm)**
2	LBA Address								**LBA Short address (based on CoordAddress from Discover.confirm)**

Data Transfer (1/3)
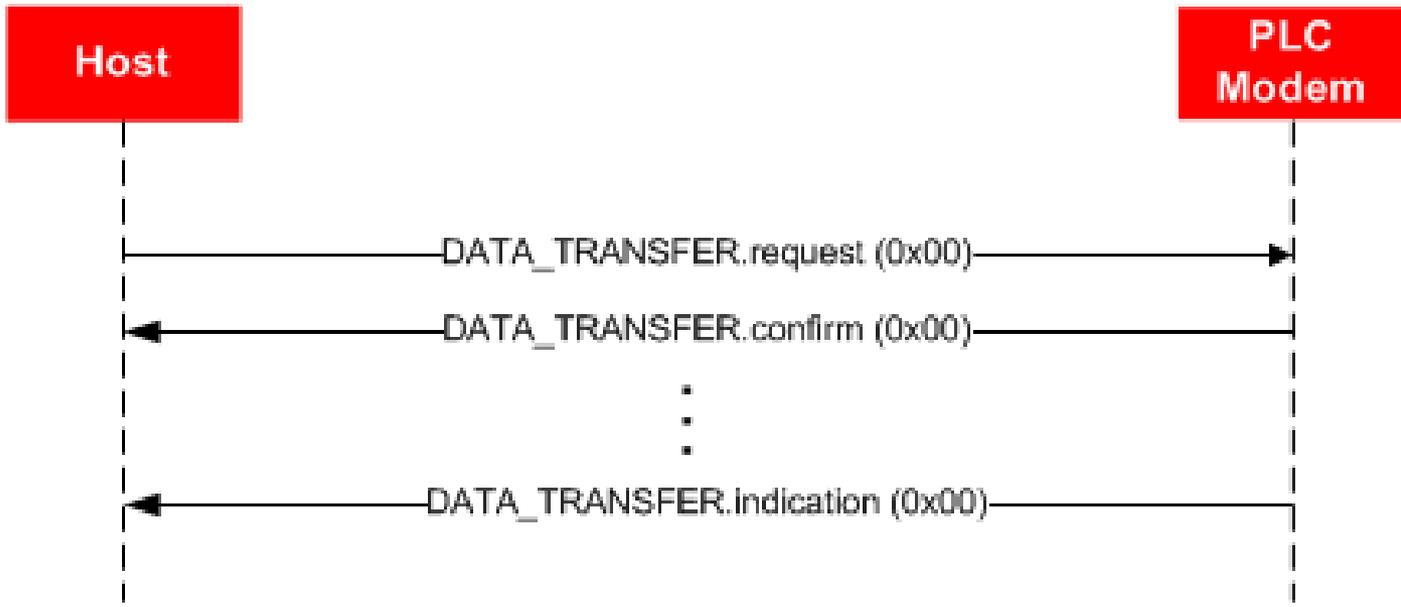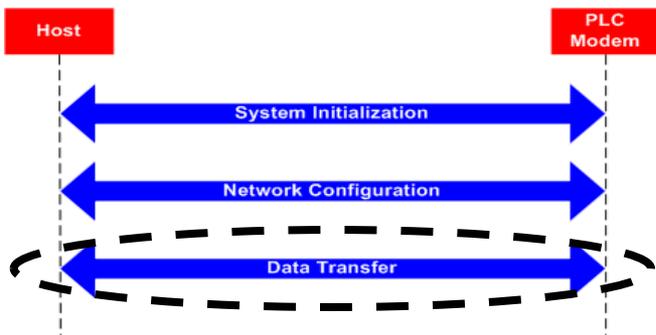
Data Transfer (2/3)

- ## DATA TRANSFER.request

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
1	NSDU Handle								**Random number between 0x00-0xFF**
1	Reserved					QoS	SEC	D-route	**0x01 (D-route=1 for automatic route discovery)**
var	L_SDU Data								**IPv6 Packet**

- ## DATA TRANSFER.confirm

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
1	NSDU Handle								
1	CFM	Reserved							**CFM=1, meaning "confirmation"**
2	Status								

Data Transfer (3/3)

- ## DATA TRANSFER.indication

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
1	Link Quality Indicator (0x00-0xFF)								
1	CFM	Phase		Reserved				SEC	**CFM=0, meaning "indication"**
var	Data Payload								**Received IPv6 Packet**

TEXAS INSTRUMENTS

G3 mini-DC: Network Configuration
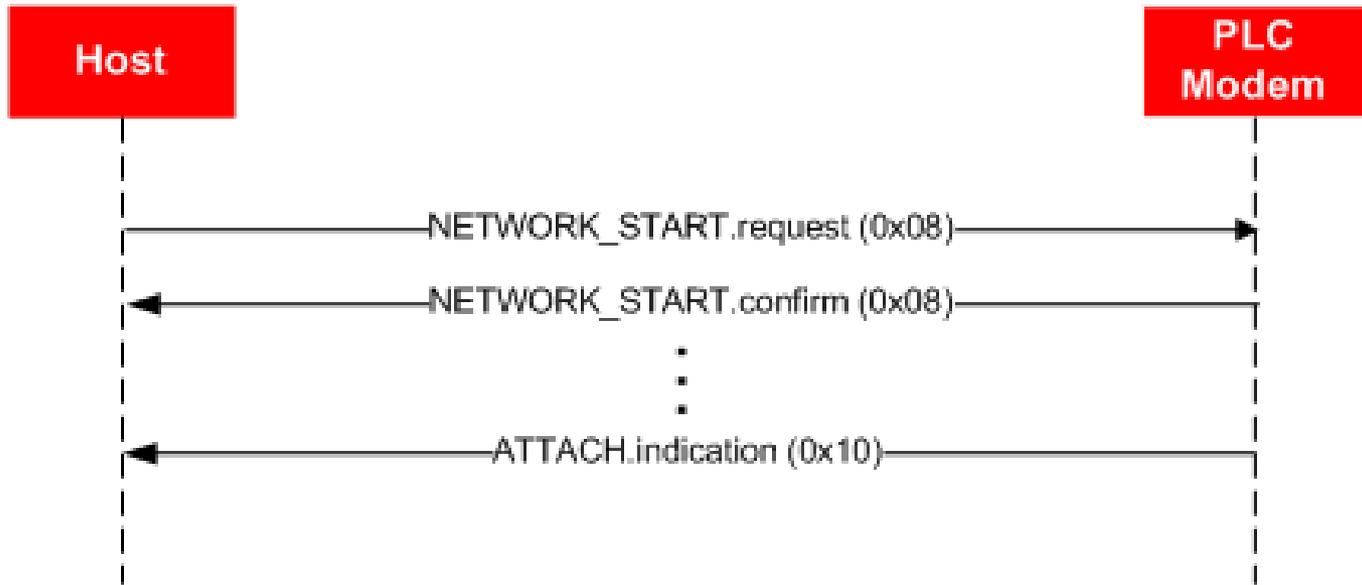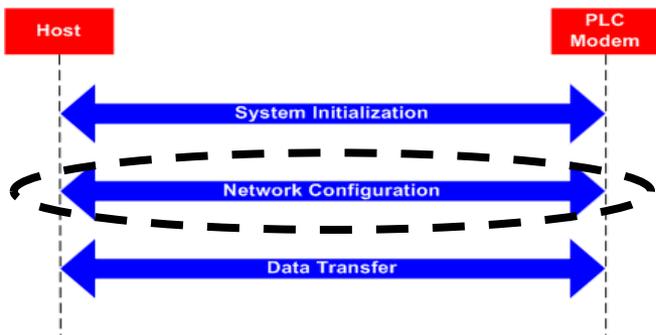
G3 mini-DC: Network Configuration

- ## NETWORK_START

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
2	PAN ID								Ranging from 0x0000 to 0xffff

- ## ATTACH.indication

Length (octets)	Bits								Comments
	7	6	5	4	3	2	1	0	
8	Network Address 1								The IPv6 Address Prefix
8	Network Address 2								The IPv6 Address Postfix
8	Extended Address								64-bit Device long address
1	Capability Info								Capability Info as defined in Fig 56 of 802.15.4-2006
1	Reserved								

TEXAS INSTRUMENTS

UDP Data Example

60 00 00 00 00 23 11 08 FE 80 00 00 00 00 00 00 74 55 00 FF FE 00 00 00 FE 80 00 00
00 00 00 00 74 55 00 FF FE 00 00 00 00 00 00 00 00 23 13 43 A0 AA 00 00 00 00 00 00
01 00 00 00 01 00 00 00 01 00 00 00 03 00 00 00 31 31 31

- IPv6 Header
  - Next Header: 17 (=UDP)
  - Payload Len: 35
  - Hop Limit: 8
  - Source Address:FE80:0000:0000:0000:7455:00FF:FE00:0000
  - Destination Address: FE80:0000:0000:0000:7455:00FF:FE00:0000
- UDP Packet:
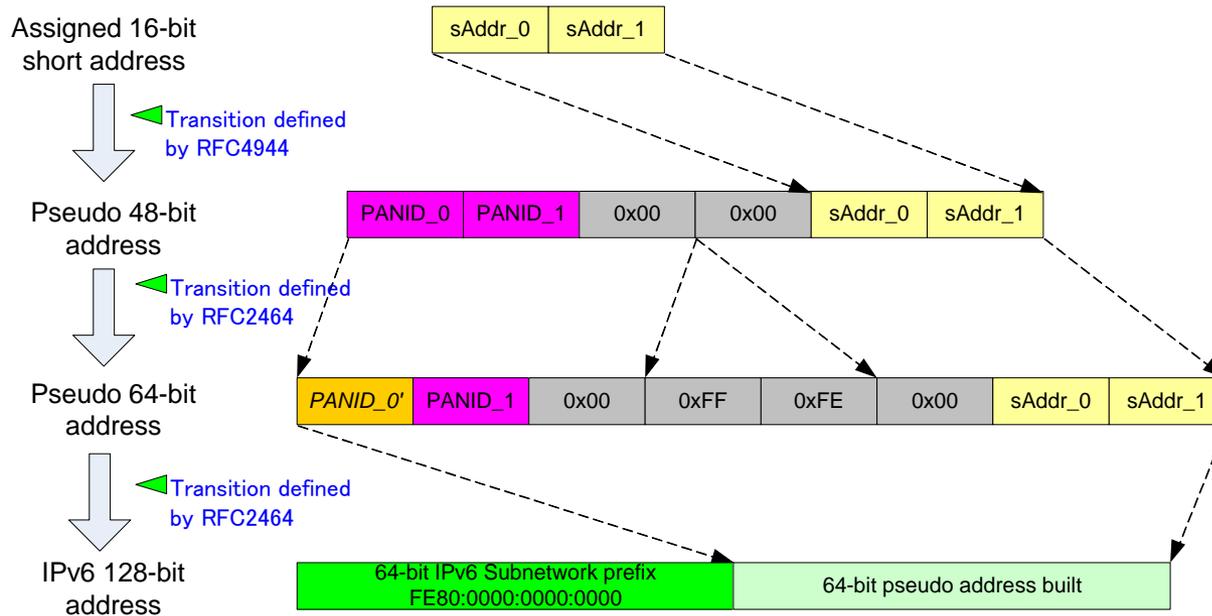 - Source Port :   0x0000
  - Destination Port: 0x0000
  - Length   :   35
  - CRC   :   0x0000
- Data:
  - 0xA0 AA 00 00 00 00 00 00 01 00 00 00 01 00 00 00 01 00 00 00 03 00 00 00 31 31 31

TEXAS INSTRUMENTS

IPv6 Address Mapping

- **Unicast IPv6 Address**

Assigned 16-bit short address → Transition defined by RFC4944 → Pseudo 48-bit address → Transition defined by RFC2464 → Pseudo 64-bit address → Transition defined by RFC2464 → IPv6 128-bit address

| sAddr_0 | sAddr_1 |

| PANID_0 | PANID_1 | 0x00 | 0x00 | sAddr_0 | sAddr_1 |

| PANID_0' | PANID_1 | 0x00 | 0xFF | 0xFE | 0x00 | sAddr_0 | sAddr_1 |

| 64-bit IPv6 Subnetwork prefix FE80:0000:0000:0000 | 64-bit pseudo address built |

- **Multicast/Broadcast**
  - **0xFE80 → 0xFF02**
  - **Last Two bytes**
    - **Broadcast (0x0001)**
    - **Multicast (Group_ID starting with 0b100): ADPGroupTable maintains ID's**

TEXAS INSTRUMENTS