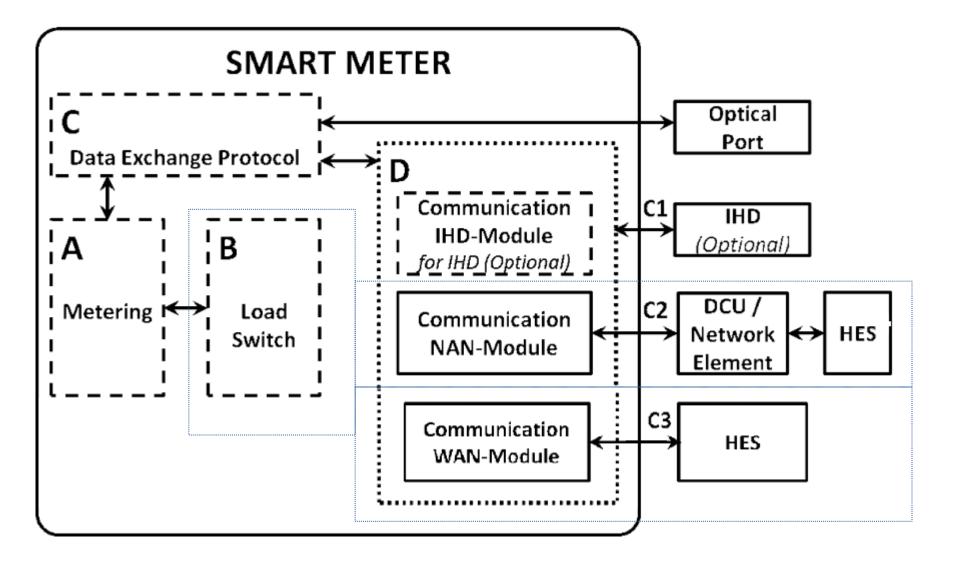
# Function Evaluation Test Tool (FET) at CPRI Bangalore For Smart Meter Testing as per IS 15959 part 2 and Part 3

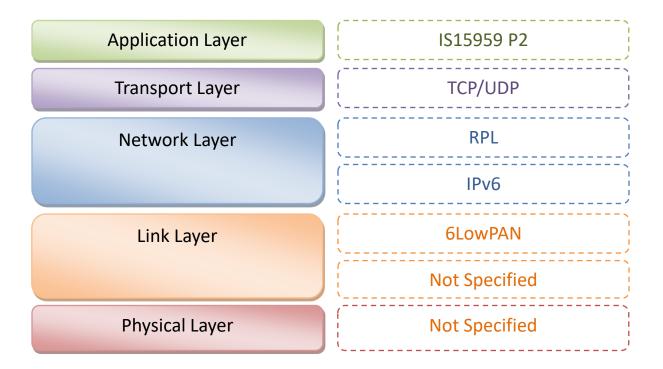
### By Kamaldev K R ,Nobin Mathew Kalki Communication Technologies Pvt Ltd

Workshop on 'Technical and Testing Challenges for Smart Meters' 2-3 November 2017, New Delhi

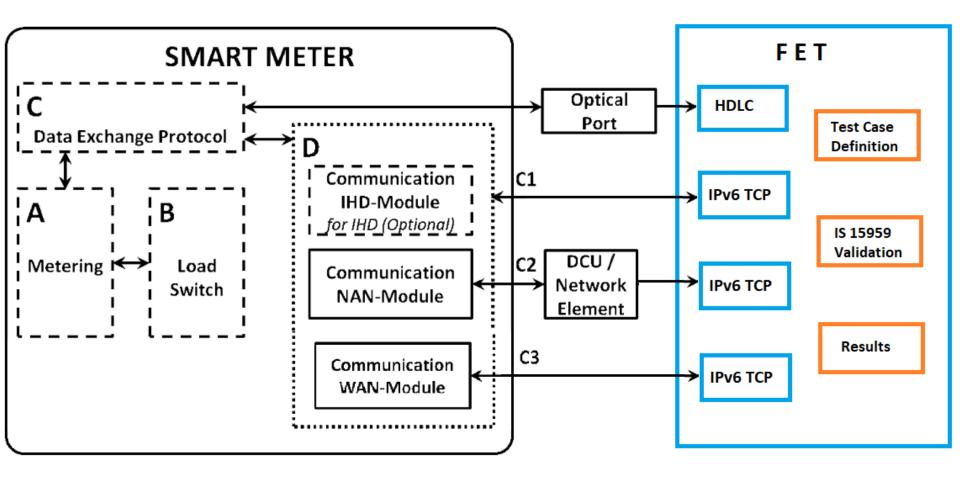
### IS15959-2 & 3 Smart Meter Block Diagram



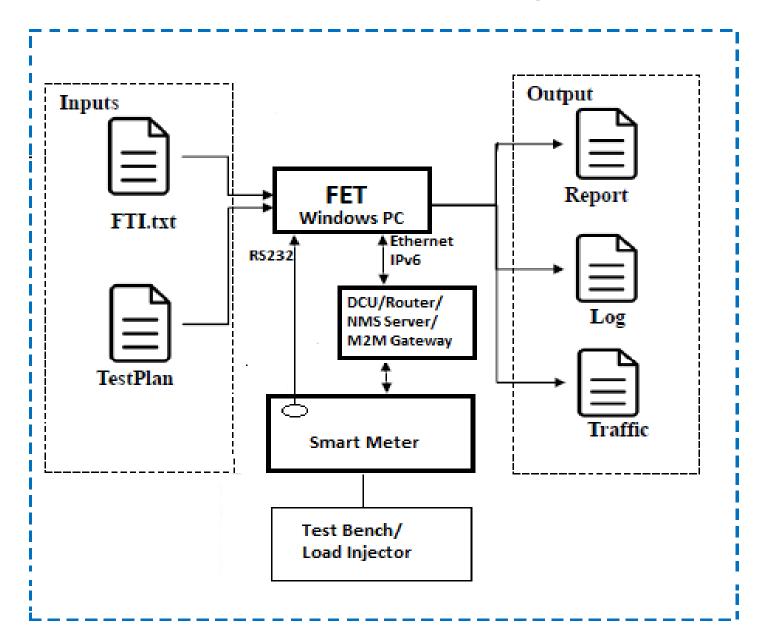
### **IS 16444 Communication Protocol Layers**



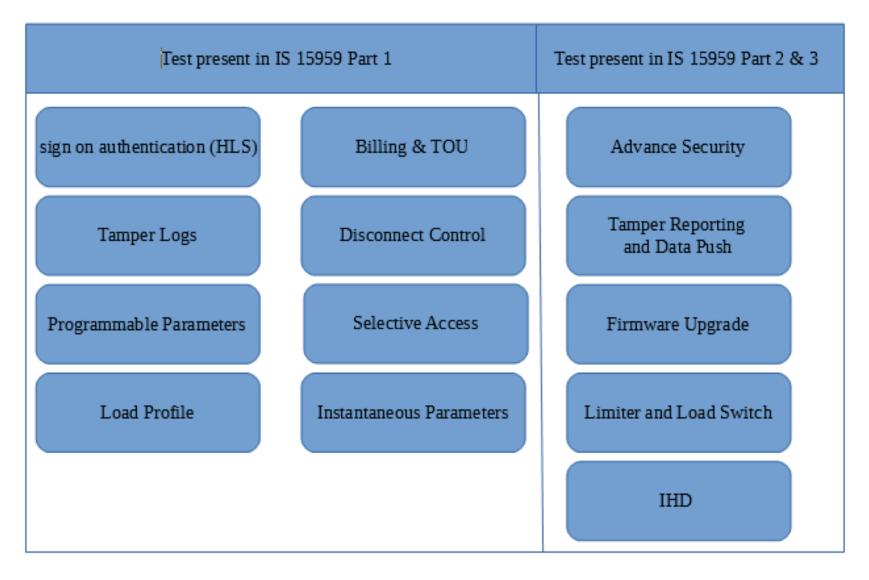
### Smart Meter – FET Interface Block Diagram



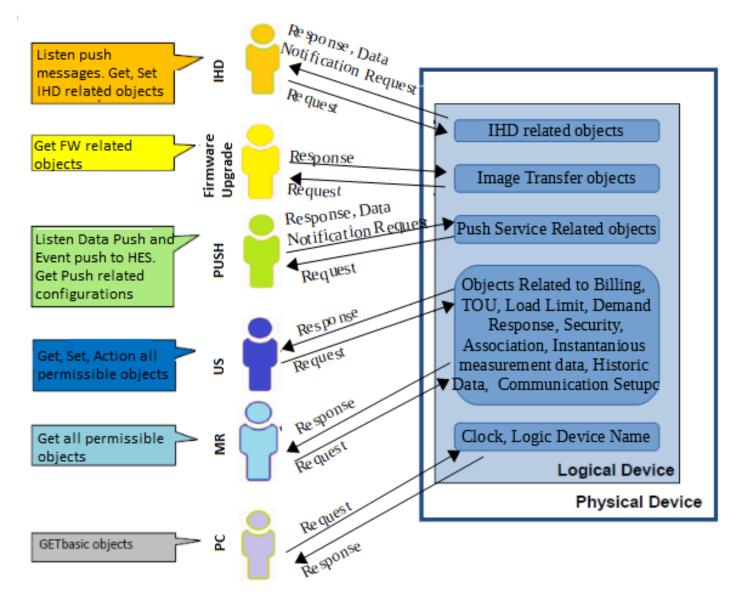
### **IS 15959 Functional Evaluation Test Setup**



# IS15959-2 & 3 Specific Tests: Categories



### IS15959-2 & 3 Associations



### **FET Test Selection**

Select All

Select None

est Case Selection Communication	
Instantaneous parameters and profiles	Name plate details
Billing	Programmable parameters
Firmware upgrade	Data notification
Basic data readout	Selective access
ObjectList Download	Event code & Event logging
	Ok Cancel
Programmable Parameters	x
TOU	Current Balance Amount
TOU Billing Date time	Current Balance Amount
Billing Date time	Current Balance Time
Billing Date time	Current Balance Time
Billing Date time	Current Balance Time
<ul> <li>Billing Date time</li> <li>Clock</li> <li>Profile Capture Period</li> <li>Demand Integration Period</li> </ul>	Current Balance Time LLS Secret HLS Key Global Key Change
<ul> <li>Billing Date time</li> <li>Clock</li> <li>Profile Capture Period</li> <li>Demand Integration Period</li> <li>Metering Mode</li> </ul>	<ul> <li>Current Balance Time</li> <li>LLS Secret</li> <li>HLS Key</li> <li>Global Key Change</li> <li>Image Activation Single Action Schedule</li> </ul>
<ul> <li>Billing Date time</li> <li>Clock</li> <li>Profile Capture Period</li> <li>Demand Integration Period</li> <li>Metering Mode</li> <li>Payment Mode</li> </ul>	<ul> <li>Current Balance Time</li> <li>LLS Secret</li> <li>HLS Key</li> <li>Global Key Change</li> <li>Image Activation Single Action Schedule</li> <li>ESWF</li> </ul>

Ok

Cancel

### FTI Input file

- FTI file is prepared by meter manufacturer
- Contents
  - Meter SN
  - Flag ID
  - Association Details
  - Security Keys
  - Comm Setup Properties
  - Event definition
  - DLMS Object details

```
CommunicationProfilesSupported = [TCP]
ApplicationContextsSupported = [LONG_NAMES_LONG_NAMES_WITH_CIPHERING]
SecurityLevelsSupported = [NO_SECURITY, LOW_LEVEL_SECURITY]
MediaIdentifiers = [ABSTRACT,ELECTRICITY]
```

LogicalDevice[0] = { Enabled = TRUE Name = "\XYZaaabbbcccdddd" ServerSAP = 1

```
Logical Device Configuration
```

Association [0] = { AssociationProperties Enabled = TRUE ClientSAP = 16 ApplicationContextName = LONG\_NAMES AuthenticationMechanismName = NO SECURITY Conformance = [ GET] DlmsVersionNumber = 6 ServerMaxReceivePduSize = 65535 MediaIdentifiers = [ABSTRACT, ELECTRICITY] SystemTitle = "\systitle" MasterKey = "11223344556677881122334455667 SecurityPolicyMinimum = NO SECURITY ID1C committee ion configuration SecurityActivateMethodSupported = TRUE GlobalKeyTransferMethodSupported = TRUE SecurityPolicyWritable = FALSE UseDedicatedKey = FALSE RLRQSupported = FALSE PreEstablished = FALSE } HDLCProfile = ( PhysicalLayer = { HdlcBaud = 9600 OpeningMode = MODE E ModeEIdString = "\aS" ModeEDelay1 = 0 ModeEDelay2 = 300 ModeEDelay3 = 1000 LastOutputToWakeUpDelay = 30000 DataLinkLayer = { AddressingSchemes = [ONE BYTE ADDRESSING, FOUR BYTE ADDRESSING] Remnest and Mantheat data and a 100

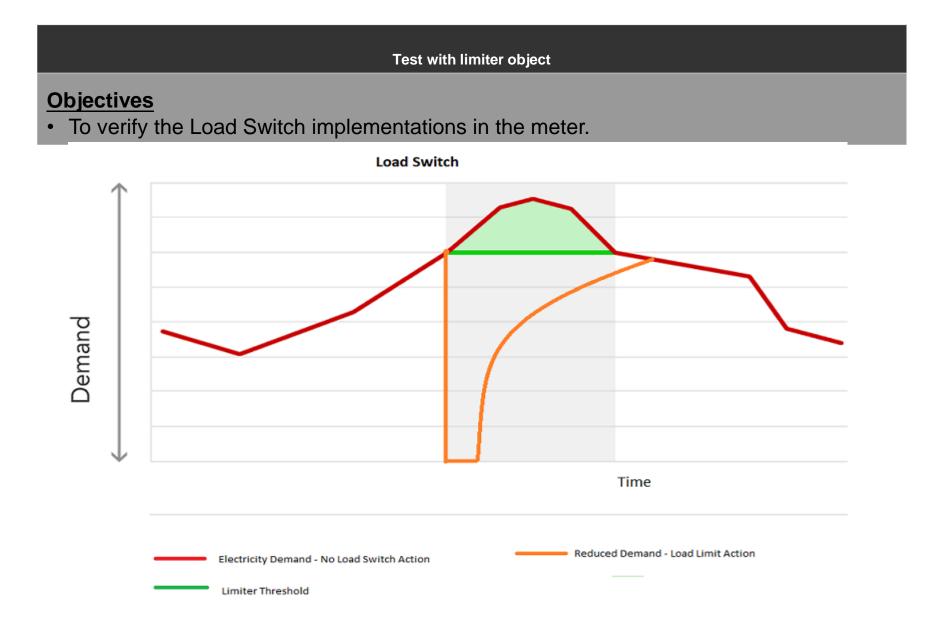
### **FET Traffic Monitor**

42 C1 59 AD B6 A6 41 D8 85 BC 28 F6 1D 09 B7 7B A8 AA F3 C7 1E 68 9B 66 BD 0F BC 85 A1 F3 8D 38 74 D8 87 4A F4 EF D4 CA 91 30 F7 56 EC B1 A3 04 E6 AF EC 8F C6 08 99 36 75 07 6F C2 98 4A Channel-0 :: Application Layer :: **SecurityInfo** Plain Text Channel-0 :: Application Layer :: 19: 14: 25: 642 <=== :: 0F 00 00 00 10 C 07 E1 0A 1E FF 13 11 12 00 08 00 00 02 0D 0A 0F 4C 4E 54 45 52 33 30 30 20 50 52 49 44 45 20 09 06 00 00 19 09 00 FF	FTI	Log_Traffic	Report
19: 13: 08: 408       ClosePort to close current Association         19: 13: 08: 535       initPort         19: 13: 08: 537       RLRQ Not Supported         19: 13: 20: 379       RLRQ Not Supported         19: 13: 20: 320       ClosePort to close current Association         19: 13: 20: 320       ClosePort to close current Association         19: 13: 20: 520       initPort         19: 13: 20: 522       ClosePort to close current Association         19: 13: 20: 523       Association Release Success         19: 13: 20: 527       Test Push Port         19: 13: 20: 527       Test Push Port         19: 13: 20: 527       Test Push Port         19: 13: 20: 529       IPv6 communication :28         19: 13: 20: 520       mem connection         19: 14: 25: 500       **** event Push Frame ***         19: 16: 16: 10: 50       Close Port         19: 16: 16: 10: 10: 10: 10: 10: 20: 20: 90 04 FF 03 FF FF 09 05 FF FF FF FF FF         19: 13: 08: 371       <===::::::::::::::::::::::::::::::::::	19: 13:	08: 406	RLRQ Not Supported
19: 13: 08: 538       Association Release Success         19: 13: 20: 579       RLRQ, Not Supported         19: 13: 20: 520       InitPort         19: 13: 20: 527       Test Push Port         19: 14: 25: 399       accept new connection .4059         19: 14: 25: 502       *** event Push Frame ***         19: 16: 16: 058       Close Port         (State) Close Port       Channelo ::: Application Layer ::         **SecurityInfo <sup>**</sup> Plain Test       Channelo ::: Application Layer ::         (State) Close Port       19: 14: 25: 488         19: 13: 20: 531       28 642 74 70 88 E0 97 42 20 87 44 85 23 33 03 07 02 00 00 00 00 75 E1 67 EF EF EF EF EF         19: 13: 20: 531       24 88 62 24 70 08 86 02 74 70 88 E0 97 42 20 85 74 86 60 76 10 85 FA 44 64 2 C 15 9A 08 6A 64 10 8 85 62 28 F1 10 98 77 8A AA F2 OT 12         19: 13: 20: 452 28 86 62 44 7 70 88 E0 97 42 20 87 64 45 86 02 76 10	19: 13:		
19: 13: 20: 379 RLRQ Not Supported 19: 13: 20: 382 ClosePort to close current Association 19: 13: 20: 520 initPort 19: 13: 20: 525 Close Port 19: 13: 20: 527 Test Push Port 19: 14: 25: 509 accept new connection 19: 14: 25: 509 accept new connection 19: 14: 25: 500 *** event Push Frame *** 19: 16: 16: 058 Close Port Closenel-0:: Appleation Layer:: **SecurityInfo** Plan Test Channel-0:: Appleation Layer:: 19: 14: 25: 480 <==:::::::::::::::::::::::::::::::::::	19:13:	08: 535 i	nitPort
19: 13: 20: 382       ClosePort to close current Association         19: 13: 20: 520       initPort         19: 13: 20: 523       Association Release Success         19: 13: 20: 525       Close Port         19: 13: 20: 527       Test Push Port         19: 14: 25: 309       accept new connection          19: 14: 25: 502       *** event Push Frame ***         19: 16: 16: 058       Close Port         19: 16: 10: 058       Close Port         19: 16: 10: 052       Close Port         19: 16: 10: 072       Close Port         19: 16: 10: 072       10: 01: 00: 01: 00: 01: 00: 01: 00: 01: 00: 02: 09: 04: FF 09: 05: FF FF FF FF         Channel-0: :::::::::::::::::::::::::::::::::::	19: 13:	08: 538	Association Release Success
19: 13: 20: 520       initPort         19: 13: 20: 523       Association Release Success         19: 13: 20: 525       Close Port         19: 13: 20: 527       Test Push Port         19: 13: 20: 527       Test Push Port         19: 13: 20: 521       IPv6 communication :28         19: 13: 20: 523       galaxies         19: 14: 25: 539       accept new connection         19: 14: 25: 502       *** event Push Frame ***         19: 16: 16: 058       Close Port         19: 13: 00: 232       Close Port         19: 13: 00: 232	19: 13: 3	20: 379 I	RLRQ Not Supported
19: 13: 20: 523       Association Release Success         19: 13: 20: 525       Close Port         19: 13: 20: 525       Test Push Port         19: 13: 20: 525       IP-6 communication :28         19: 13: 20: 521       IP-6 communication :4059         19: 14: 25: 399       accept new connection         19: 14: 25: 502       ****         19: 16: 16: 058       Close Port         19: 14: 25: 502       ****         19: 16: 16: 058       Close Port         19: 13: 00: 202       ****         19: 16: 16: 058       Close Port         19: 13: 00: 202       ****         19: 13: 00: 202       ****         19: 13: 00: 248       <===::::::::::::::::::::::::::::::::::	19: 13: 3	20: 382	ClosePort to close current Association
19: 13: 20: 525       Close Port         19: 13: 20: 527       Test Push Port         19: 13: 20: 529       IPv6 communication :28         19: 13: 20: 521       plafilistenConnection :4059         19: 14: 25: 399       accept new connection         19: 14: 25: 502       *** event Push Frame ***         19: 16: 16: 058       Close Port         19: 16: 16: 058       Close Port         19: 13: 00: 529       IPv6 to 01 10 00 10 10 20 20 90 4F 03 FF FF 09 05 FF FF FF FF         19: 13: 00: 529       ::::::::::::::::::::::::::::::::::::	19: 13: 3	20: 520 i	nitPort
19: 13: 20: 527       Test Push Port         19: 13: 20: 527       Test Push Port         19: 13: 20: 521       IPv6 communication :28         19: 13: 20: 521       plafListenConnection :4059         19: 14: 25: 309       accept new connection         19: 14: 25: 502       *** event Push Frame ***         19: 14: 25: 502       *** event Push Frame ***         19: 14: 25: 502	19:13:	20: 523	Association Release Success
19: 13: 20: 529 IPv6 communication :28 19: 13: 20: 531 plafListenConnection :4059 19: 14: 25: 399 accept new connection 19: 14: 25: 502 *** event Push Frame *** 19: 16: 16: 058 Close Port 19: 13: 00: 220 *** event Push Frame *** 19: 16: 16: 058 Close Port 19: 13: 00: 220 *** event Push Frame *** 19: 16: 16: 058 Close Port 19: 13: 00: 220 *** event Push Frame *** 19: 16: 16: 058 Close Port 19: 13: 00: 240 *** event Push Frame *** 19: 13: 00: 248 <=== :: 04 10 41 00 01 01 20 20 09 04 FF 03 FF FF 09 05 FF FF FF FF Channel-0 :: Application Layer :: **SecurityInfo** Plain Text Channel-0 :: Application Layer :: 19: 13: 00: 348 <= :: :: 00 01 00 01 00 40 00 7B 08 08 4C 4E 54 45 52 33 03 07 02 00 00 00 07 F3 E1 03 04 79 75 80 18 73 1E 5A 38 66 64 A9 A8 62 EE C0 EF 92 19: 13: 08: 548 <= :: 00 01 00 01 00 40 00 7B 08 08 4C 4E 54 45 52 33 03 07 02 00 00 00 07 F3 E1 03 04 79 75 80 18 73 1E 5A 38 66 64 A9 A8 62 EE C0 EF 92 19: 14: 25: 488 <= :: 00 01 00 01 00 40 00 7B 08 08 4C 4E 54 45 52 33 03 07 02 00 00 00 07 F3 E1 03 04 79 75 80 18 73 1E 5A 38 66 64 A9 A8 62 EE C0 EF 92 19: 14: 25: 488 <= :: 00 01 00 01 00 40 00 7B 08 08 74 A F4 EF D4 CA 91 30 F7 56 CE B1 A3 04 E6 AF EC 8F C6 08 99 36 75 07 6F C2 98 4A Channel-0 :: Application Layer :: *5ecurityInfo** EncKey:1234567890123456 AuthKey:1234567890123456 Channel-0 :: Application Layer :: *5ecurityInfo** EncKey:1234567890123456 AuthKey:1234567890123456 (hannel-0 :: Application Layer :: *5ecurityInfo** Fist E1 03 04 79 75 80 18 73 1E 5A 38 66 64 A9 A8 62 EE C0 EF 92 19 17 3C 14 52 28 86 42 74 7D 8E E0 97 42 20 85 74 86 08 76 10 85 FA 4 42 C1 59 A D8 6A 64 1D 88 5D 28 F5 07 6F C2 98 4A Channel-0 :: Application Layer :: *5ecurityInfo** Fist E1 03 04 79 7	19: 13: 3	20: 525	Close Port
19: 13: 20: 531 plafListenConnection :4059 19: 14: 25: 399 accept new connection 19: 14: 25: 502 *** event Push Frame *** 19: 16: 16: 058 Close Port Channel 0: : Application Layer :: ***SecurityInfo** Plan Text Channel 0: : Application Layer :: 19: 13: 08: 371 <=== :: C4 01 41 00 01 01 02 02 09 04 FF 03 FF FF 09 05 FF FF FF FF FF FF Channel 0: : Application Layer :: 19: 13: 08: 371 <=== :: C4 02 00 00 00 00 00 04 01 10 01 01 02 02 09 04 FF 03 FF FF FF FF FF FF Channel 0: : Application Layer :: 19: 13: 08: 371 <=== :: C4 02 01 00 01 00 01 00 01 00 10 02 02 09 04 FF 03 FF FF FF FF FF FF FF Channel 0: : Application Layer :: 19: 14: 25: 488 <== :: C4 02 00 00 00 00 04 00 07 FD 08 08 4C 4E 54 45 52 33 30 30 70 20 00 00 00 07 F3 E1 03 04 79 75 80 18 73 1E 5A 38 66 64 A9 A8 62 EE 00 FF 92 19: 14: 25: 488 <=:: C4 00 10 00 10 00 10 04 00 07 B 08 84 C4 E5 44 55 23 33 03 07 20 00 00 00 07 F3 E1 03 04 79 75 80 18 73 1E 5A 38 66 64 A9 A8 62 EE 00 FF 92 19: 14: 25: 488 <=:: C4 00 10 00 10 00 10 04 00 78 D8 08 4C 4E 54 45 52 33 30 30 70 20 00 00 00 07 F3 E1 03 04 79 75 80 18 73 1E 5A 38 66 64 A9 A8 62 EE 00 FF 92 19: 14: 25: 488 <=:: C4 00 10 00 10 00 10 00 10 00 10 00 10 00 10 00 10 00 10 00 10 00 75 08 01 87 75 6E CB 1A 30 4E 6A FE CB FC 60 88 99 36 75 07 6F C2 98 4A Channel 0:: Application Layer :: ***SecurityInfo** Cpher Text Channel 0:: Application Layer :: ***SecurityInfo** Cpher Text Channel 0:: Application Layer :: ***SecurityInfo** Cpher Text Channel 0:: Application Layer :: ***SecurityInfo** T5 E1 03 04 79 75 80 1B 73 1E 5A 38 66 64 A9 A8 62 EE 00 EF 92 19 17 3C 14 52 28 86 42 74 70 8E E0 97 42 20 85 74 86 08 76 10 85 FA 4 42 C1 59 A0 BE A6 41 10 B8 5B C2 BF 10 10 98 77 BA AA F3 C7 1E 68 98 66 BD 0F BC 85 A1 F3 8D 38 74 A F4 EF D4 CA 91 30 F7 56 EC B1 A3 04 E6 AF EC BF C6 00 89 36 75 07 6F C2 98 4A Channel 0:: Application Layer :: **SecurityInfo** Plan Text Channel 0:: Application Layer :: **SecurityInfo** Plan Text Channel 0:: Application Layer :: **SecurityInfo** Plan Text Channel	19: 13: 3	20: 527	Fest Push Port
19: 14: 25: 399 accept new connection 19: 14: 25: 502 *** event Push Frame *** 19: 16: 16: 058 Close Pot 19: 14: 25: 502 *** event Push Frame *** 19: 16: 16: 058 Close Pot Channel: :: Application Layer :: ""Security/Info"* Plan Text Channel: :: Application Layer :: 19: 13: 08: 348 <=== :: C4 01 41 00 01 01 02 02 09 04 FF 03 FF FF 09 05 FF FF FF FF FF Channel: :: Application Layer :: 19: 13: 08: 371 <=== :: D4 26 30 00 00 00 02 (4 01 41 00 01 01 02 02 09 04 FF 03 FF FF 09 05 FF FF FF FF FF Channel: :: Transport Layer :: 19: 14: 25: 488 <== :: 00 01 00 01 00 40 00 78 DB 08 4C 4E 54 45 52 33 03 07 02 00 00 00 00 73 E1 03 04 79 75 80 1B 73 1E 5A 38 66 64 A9 AB 62 EE C0 EF 92 19 17 3C 14: 52 28 86 42 74 7D 8E E0 97 42 20 B5 74 86 08 76 10 85 FA 4C 42 C1 59 AD 86 A6 41 D8 85 BC 28 F6 10 09 87 7B A8 AA F3 C7 1E 63 86 66 BD 0F 8C 85 A1 F3 BD 38 74 DB 87 4A F4 EF D4 CA 91 30 F7 56 EC B1 A3 04 E6 AF EC 8F C6 08 99 36 75 07 6F C2 98 4A channel: :: Application Layer :: **Security/Info** Cpiher Text Channel: :: Application Layer :: **Security/Info** Tibe A6 44 1D 88 5B C2 BF 10 10 98 77 BA AA F3 C7 1E 68 98 66 BD 0F 8C 85 A1 F3 8D 38 74 B6 74 10 85 FA 4 42 C1 59 AD B6 A6 41 0B 85 C2 B 70 10 98 77 BA AA F3 EC 71 E 68 98 66 BD 0F 8C 85 A1 F3 8D 38 74 B6 74 86 08 76 10 85 FA 4 42 C1 59 AD B6 A6 41 0B 85 BC 2BF 61 00 99 77 6C 29 84 A Channel: :: Application Layer :: **Security/Info** Tibe Text Channel: :: Application Layer :: **Security	19: 13: 3	20: 529	Pv6 communication :28
19: 14: 25: 502 *** event Push Frame *** 19: 16: 16: 058 Close Port 19: 13: 00: 290 < 0.00 Close Port Channel-0 :: Application Layer :: 19: 13: 00: 398 < :: 00 10: 00 10: 00 00: 00: 00: 00: 00:	19:13:	20: 531	olafListenConnection :4059
19: 16: 16: 058 Close Port 19: 16: 16: 058 Close Port 19: 13: 00: 250 < <	19: 14: 3	25: 399 👘	accept new connection
19: 10: 00: 200       C+==       00 00 7D 10 33 2E 20 80 St B0 CP 91 99 CB 00 4C CD 00 CS E0 FD         Channel-0: : Application Layer ::       **SecurityInfo**Plain Text         Channel-0: : Application Layer ::       10: 10: 20 20 90 4FF 03 FF FF 69 05 FF FF FF FF         19: 13: 08: 328       <===	19: 14: 3	25: 502	*** event Push Frame ***
Channel-0 :: Application Layer :: **SecurityInfo** Plain Text (channel-0 :: Application Layer :: 19: 13: 08: 348 <=== :: C4 01 41 00 01 01 02 02 09 04 FF 03 FF FF 09 05 FF FF FF FF FF (channel-0 :: Application Layer :: 19: 13: 08: 371 <== :: D4 26 30 00 00 00 C4 01 41 00 01 01 02 02 09 04 FF 03 FF FF 09 05 FF FF FF FF (channel-0 :: Application Layer :: 19: 13: 08: 371 <== :: D0 01 00 01 00 40 00 7B DB 08 4C 4E 54 45 52 33 30 30 70 20 00 00 00 7F 3E 10 3 04 79 75 80 1B 73 1E 5A 38 66 64 A9 AB 62 EE C0 EF 92 19: 14: 25: 488 <			Close Port
	19: 13: 0 Channel-( 19: 13: 0 Channel-( 19: 14: 2 Channel-( *** Channel-( 19: 14: 2 Channel-( 19: 14: 2 Channel-( 19: 14: 2 Channel-( 19: 14: 2 Channel-( 19: 14: 2) Channel-( 19: 14: 2)	18: 348 <= 0 :: Applicatio 18: 371 <= 0 :: Transport 15: 488 < 0 :: Applicatio SecurityInfo* 0 :: Applicatio SecurityInfo* 0 :: Applicatio 5: 585 <= 0 :: Applicatio 5: 585 <= 0 :: Applicatio 5: 585 <=	<pre>=::: C4 01 41 00 01 01 02 02 09 04 FF 03 FF FF 09 05 FF FF FF FF FF FF 09 05 FF FF FF FF FF 10 Layer :: ==::: D4 26 30 00 00 00 C4 01 41 00 01 01 02 02 09 04 FF 03 FF FF 09 05 FF FF FF FF FF Layer :: =:::: 00 01 00 01 00 40 00 7B DB 08 4C 4E 54 45 52 33 30 30 70 20 00 00 00 7F 3E 10 30 47 97 58 01 B 73 1E 5A 38 66 64 A9 AB 62 EE C0 EF 92 19 17 3C 14 52 28 86 42 74 7D 8E E0 97 42 20 B5 74 86 08 76 10 85 FA 4C 42 C1 59 AD B6 A6 41 D8 85 BC 2B F6 1D 09 B7 7B A8 AA F3 C7 1E 68 9B 66 BD 0F BC 85 A1 F3 8D 38 74 D8 87 4A F4 EF D4 CA 91 30 F7 56 EC B1 A3 04 E6 AF EC 8F C6 08 99 36 75 07 6F C2 98 4A n Layer :: * SC :20 FrameCounter:00000007 n Layer :: * EncKey:1234567890123456 AuthKey:1234567890123456 n Layer :: * Cpher Text n Layer :: * Cipher Text n Layer :: * Cipher Text n Layer :: * F3 E1 03 04 79 75 80 1B 73 1E 5A 38 66 64 A9 AB 62 EE C0 EF 92 19 17 3C 14 52 28 86 42 74 7D 8E E0 97 42 20 B5 74 86 08 76 10 85 FA 4( 42 C1 59 AD B6 A6 41 D8 85 BC 2B F6 1D 09 B7 7B A8 AA F3 C7 1E 68 9B 66 BD 0F BC 85 A1 F3 8D 38 74 D8 87 4A F4 EF D4 CA 91 30 F7 56 EC B1 A3 04 E6 AF EC 8F C6 08 99 36 75 07 6F C2 98 4A n Layer :: * Plain Text n Layer :: * Plain Text</pre>

### **FET Test Report**

FTI Log_Traffic Report		
Test House fh	IUT Serial Number	d
Date And Time Tue Oct 24 2:15 PM 2017	IUT Rating	d
IUT Manufacturer Name d	IUT Category	d
IUT Model Name dd	CPRI Sample Code	d
1Byte Addressing test( PC Association )		
Link Layer Test	PASSED	
Application Layer Associate Test	PASSED	
Link Layer Disconnect Test	PASSED	
Object List Download Test	PASSED	
1Byte Addressing test( MR Association )		
Link Layer Test	PASSED	
Application Layer Associate Test	PASSED	
Link Layer Disconnect Test	PASSED	
Object List Download Test	PASSED	
1Byte Addressing test( US Association )		
Link Layer Test	PASSED	
Application Layer Associate Test	PASSED	
Link Layer Disconnect Test	PASSED	
Object List Download Test	PASSED	
1Byte Addressing test( PUSH Association )		
Link Layer Test	SKIPPED	
Application Layer Associate Test	SKIPPED	
Object List Download Test	SKIPPED	
Link Layer Disconnect Test	SKIPPED	
1Byte Addressing test( Firmware Association )		
Link Layer Test	SKIPPED	
Application Layer Associate Test	SKIPPED	
Object List Download Test	SKIPPED	
Link Layer Disconnect Test	SKIPPED	

# **IS15959-2 Specific Test Cases**



### Load Limiter Test with Meter Explorer

METER EXPLORER	Parameter				Value			
METER-1 (DLMS-TCP)	Push obis co	ode		0.0.0.0.0				
ASSOCIATION-1 Add Objectlist	Push Index			0				
Edit	Secret Type			Visible String				
Delete	Secret							
Download Object List		mum Receive PDU size		65535				
Test Configuration	DLMS Versio			6				
		ct List Download		Disabled				
		onformance			h-get-or-read, 12-block-transfer-with	n-set-or-write, 19-get		
		Object Version		0				
I I		mum Receive PDU Size		0				
I I		Conformance						
I I	Invocation C			0				
I I	Security Pol	icy during AA establishment		No Security				
	Date time	display format	Register values					
	O DLMS .	octet string ) dd/mm/yyyy HH:MM:ss.fff	Apply scalar and unit					
OBJECTLIST	^	Name	Value	Time Stamp	DataType	Access Right		
⊞ Billing period counter [1](0-0-0-1-0-255)		logical name [A]	0,0,17,0,0,255	10:48:47	OCTET_STRING	Read Only		
<ul> <li>No. of available billing periods [1](0-0-0-1-1-255)</li> </ul>		monitored_value [A]	Click Here	10:48:47	STRUCTURE	Read Only		
Time stamp of the billing period [1] VZ [last reset](0-0-0-1-2-255)		threshold_active [A]	51840	10:48:47	DOUBLE_LONG_UNSIGNED	Read Only		
⊞ Clock(0-0-1-0-0-255)		threshold_normal [A]	51840	10:48:47	DOUBLE_LONG_UNSIGNED	Read Write		
Push script table(0-0-10-0-108-255)		threshold_emergency [A]	51840	10:48:47	DOUBLE_LONG_UNSIGNED	Read Only		
⊞ Push(0-0-15-0-4-255)		min_over_threshold_duration [A]	0	10:48:47	DOUBLE_LONG_UNSIGNED	Read Only		
E Limiter(0-0-17-0-0-255)		<sup>#</sup> min_under_threshold_duration [A]	0	10:48:47	DOUBLE_LONG_UNSIGNED	Read Only		
0-0-17-0-0-255_logical_name (H)								
0-0-17-0-0-255_monitored_value [A]								
0-0-17-0-0-255_threshold_active [A]								
0-0-17-0-0-255_threshold_normal [A]								
0-0-17-0-0-255_threshold_emergency [A]								
0-0-17-0-0-255_min_over_threshold_duration [A]								
0-0-17-0-0-255_min_under_threshold_duration [A]		Data time direct		aluar				
IEC HDLC setup(0-0-22-0-0-255)		Date time display format DLMS octet string  dd/mm/yyy	Register v	alues				

# Load Limiter Test with Meter Explorer

					_	
Clock(0-11-1-0-1-255)     ^	Name		Value	Time Stamp	DataType	Access Right
Modem configuration(0-11-2-0-0-255)	threshold_no	ormal (A)	5464	19:08:04	DOUBLE_LONG -	Read Write
<ul> <li>Register monitor(0-11-16-0-1-255)</li> </ul>						
Register monitor(0-11-16-0-2-255)						
Limiter(0-11-17-0-3-255)						
0-11-17-0-3-255_logical_name [A]						
0-11-17-0-3-255_monitored_value [A]						
0-11-17-0-3-255_threshold_active (A)	:					
0-11-17-0-3-255_threshold_normal [A]	1					
0-11-17-0-3-255_threshold_emergency Write						
0-11-17-0-3-255_min_over_threshold_duration [A]						
0-11-17-0-3-255_min_under_threshold_duration [A]						
0-11-17-0-3-255_emergency_profile (A)						
0-11-17-0-3-255_emergency_profile_group_id_list [A]						
0-11-17-0-3-255_emergency_profile_active [A]	- Date time o	display format	Regist	er values		
0-11-17-0-3-255_actions [A]	O DLMS o	ctet string 🛛 💿 d	1/mm/yyyy HH:MM:ss.fff 🛛 🔽 Aj	ply scalar and unit		
0-11-17-0-3-255_actions [A]	O DLMS o	ctet string	i/mm/yyyy HH:MM:ss.fff 📃 🗹 Aj	pply scalar and unit		
0-11-1/-0-3-255_actions [A]     ✓     Event Status Word(0-0-94-91-18-255)		ctet string	J/mm/yyyy HH:MM:ss.fff		Stamp	DataType
	-		Value	Time	: Stamp 48 : 47	DataType OCTET_STRING
Event Status Word(0-0-94-91-18-255)	-	Name	Value 0,0,96,5	;10,255 10 :		
<ul> <li></li></ul>	-	Name logical name [/	Value 0,0,96,5 A] 1	Time 1,10,255 10 : 10 :	48 : 47	OCTET_STRING
<ul> <li></li></ul>	-	Name logical name [/ output_state	Value           J         0,0,96,3           A]         1           (A]         1	Time ,10,255 10 : 10 : 10 :	48 : 47 48 : 47	OCTET_STRING BOOLEAN
<ul> <li></li></ul>	-	Name logical name [/ output_state control_state control_mode	Value           J         0,0,96,3           A]         1           (A]         1	Time 1,10,255 10 : 10 : 10 : 10 : 10 :	48 : 47 48 : 47 48 : 47	OCTET_STRING BOOLEAN ENUM
<ul> <li>Event Status Word(0-0-94-91-18-255)</li> <li>EventStatusWordFilter(0-0-94-91-26-255)</li> <li>Device ID 1, manufacturing number(0-0-96-1-0-255)</li> <li>Device ID(0-0-96-1-1-255)</li> <li>Device ID(0-0-96-1-4-255)</li> <li>No. of configuration program changes(0-0-96-2-0-255)</li> <li>Disconnect control(0-0-96-3-10-255)</li> </ul>	-	Name logical name [/ output_state control_state control_mode remote_disco	Value           Value           0,0,96,3           A]           1           (A]           1           (A]           6	Time 1,10,255 10: 10: 10: 10: 10:	48 : 47 48 : 47 48 : 47 48 : 47 48 : 47	OCTET_STRING BOOLEAN ENUM ENUM
<ul> <li>Event Status Word(0-0-94-91-18-255)</li> <li>EventStatusWordFilter(0-0-94-91-26-255)</li> <li>Device ID 1, manufacturing number(0-0-96-1-0-255)</li> <li>Device ID(0-0-96-1-1-255)</li> <li>Device ID(0-0-96-1-4-255)</li> <li>No. of configuration program changes(0-0-96-2-0-255)</li> </ul>	-	Name logical name [/ output_state control_state control_mode remote_disco	Value           Value           0,0,96,3           A]           1           (A]           1           (A]           1           (A]           0,0,96,3           (A)           1           (A)           1           (A)           0	Time 1,10,255 10: 10: 10: 10: 10:	48 : 47 48 : 47 48 : 47 48 : 47 48 : 47 48 : 47	OCTET_STRING BOOLEAN ENUM ENUM INTEGER
Event Status Word(0-0-94-91-18-255)     EventStatusWordFilter(0-0-94-91-26-255)     Device ID 1, manufacturing number(0-0-96-1-0-255)     Device ID(0-0-96-1-1-255)     Device ID(0-0-96-1-4-255)     No. of configuration program changes(0-0-96-2-0-255)     Disconnect control(0-0-96-3-10-255)     Demond Scap	-	Name logical name [/ output_state control_state control_mode remote_disco	Value           Value           0,0,96,3           A]           1           (A]           1           (A]           1           (A]           0,0,96,3           (A)           1           (A)           1           (A)           0	Time 1,10,255 10: 10: 10: 10: 10:	48 : 47 48 : 47 48 : 47 48 : 47 48 : 47 48 : 47	OCTET_STRING BOOLEAN ENUM ENUM INTEGER
<ul> <li>Event Status Word(0-0-94-91-18-255)</li> <li>EventStatusWordFilter(0-0-94-91-26-255)</li> <li>Device ID 1, manufacturing number(0-0-96-1-0-255)</li> <li>Device ID(0-0-96-1-1-255)</li> <li>Device ID(0-0-96-1-4-255)</li> <li>Device ID(0-0-96-1-4-255)</li> <li>No. of configuration program changes(0-0-96-2-0-255)</li> <li>Disconnect control(0-0-96-3-10-255)</li> <li>O-96-3-10-255_logical_name [A]</li> </ul>	-	Name logical name [/ output_state control_state control_mode remote_disco	Value           Value           0,0,96,3           A]           1           (A]           1           (A]           1           (A]           0,0,96,3           (A)           1           (A)           1           (A)           0	Time 1,10,255 10: 10: 10: 10: 10:	48 : 47 48 : 47 48 : 47 48 : 47 48 : 47 48 : 47	OCTET_STRING BOOLEAN ENUM ENUM INTEGER
<ul> <li>Event Status Word(0-0-94-91-18-255)</li> <li>EventStatusWordFilter(0-0-94-91-26-255)</li> <li>Device ID 1, manufacturing number(0-0-96-1-0-255)</li> <li>Device ID(0-0-96-1-1-255)</li> <li>Device ID(0-0-96-1-4-255)</li> <li>No. of configuration program changes(0-0-96-2-0-255)</li> <li>Disconnect control(0-0-96-3-10-255)</li> <li>Demand Scan</li> <li>0-0-96-3-10-255_logical_name [A]</li> </ul>		Name logical name [/ output_state control_state control_mode remote_disco	Value           Value           0,0,96,3           A]           1           (A]           1           (A]           1           (A]           0,0,96,3           (A)           1           (A)           1           (A)           0	Time 1,10,255 10: 10: 10: 10: 10:	48 : 47 48 : 47 48 : 47 48 : 47 48 : 47 48 : 47	OCTET_STRING BOOLEAN ENUM ENUM INTEGER
<ul> <li>Event Status Word(0-0-94-91-18-255)</li> <li>EventStatusWordFilter(0-0-94-91-26-255)</li> <li>Device ID 1, manufacturing number(0-0-96-1-0-255)</li> <li>Device ID(0-0-96-1-1-255)</li> <li>Device ID(0-0-96-1-4-255)</li> <li>No. of configuration program changes(0-0-96-2-0-255)</li> <li>Disconnect control(0-0-96-3-10-255)</li> <li>Disconnect control(0-0-96-3-10-255)</li> <li>Demand Scan</li> <li>0-0-96-3-10-255_logical_name [A]</li> <li>0-0-96-3-10-255_control_state [A]</li> <li>0-0-96-3-10-255_control_state [A]</li> </ul>		Name logical name [/ output_state control_state control_mode remote_disco	Value           Value           0,0,96,3           A]           1           (A]           1           (A]           1           (A]           0,0,96,3           (A)           1           (A)           1           (A)           0	Time 1,10,255 10: 10: 10: 10: 10:	48 : 47 48 : 47 48 : 47 48 : 47 48 : 47 48 : 47	OCTET_STRING BOOLEAN ENUM ENUM INTEGER
<ul> <li>Event Status Word(0-0-94-91-18-255)</li> <li>EventStatusWordFilter(0-0-94-91-26-255)</li> <li>Device ID 1, manufacturing number(0-0-96-1-0-255)</li> <li>Device ID(0-0-96-1-1-255)</li> <li>Device ID(0-0-96-1-4-255)</li> <li>No. of configuration program changes(0-0-96-2-0-255)</li> <li>Disconnect control(0-0-96-3-10-255)</li> <li>Disconnect control(0-0-96-3-10-255)</li> <li>Demand Scan</li> <li>0-0-96-3-10-255_logical_name [A]</li> <li>0-0-96-3-10-255_control_state [A]</li> <li>0-0-96-3-10-255_control_state [A]</li> <li>0-0-96-3-10-255_control_mode [A]</li> </ul>		Name logical name [/ output_state control_state control_mode remote_disco	Value           Value           0,0,96,3           A]           1           (A]           1           (A]           1           (A]           0,0,96,3           (A)           1           (A)           1           (A)           0	Time 1,10,255 10: 10: 10: 10: 10:	48 : 47 48 : 47 48 : 47 48 : 47 48 : 47 48 : 47	OCTET_STRING BOOLEAN ENUM ENUM INTEGER

# IS15959-2 & 3 Specific Test Cases

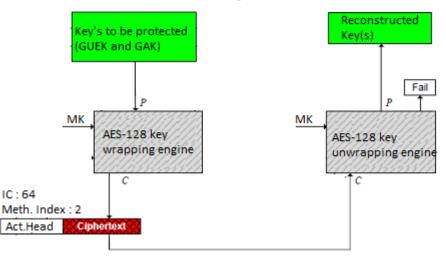
#### **Advanced Security Test**

#### **Objectives**

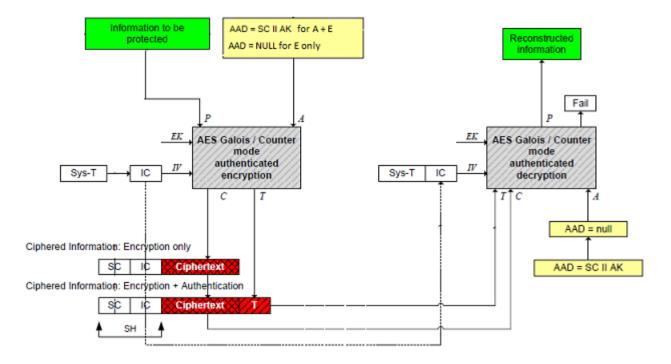
- To test the advance security implemented in data access..
- To test the Key change process.

- Requirements for security
  Assurance of Confidentiality, authenticity and integrity
  man-in-the-middle attack & replay attack

#### **Global Key Transfer**



### **Authentication and Encryption**



### **Advance Security Configuration in Meter Explorer**

Association			×
Client ID	48		^
Logical Device ID	1		
Application Context	Logical Name with Ciphering	•	
Pre established Association	False	•	
Authentication mechanism	High Level	-	
Push Configuration	Disable	•	
Push obis code	0.0.0.0.0	Disi	able
Push Index	0		
Secret Type	Visible String	•	
Secret	Test_HLS_KEY_xxx		
Client Maximum Receive PDU size	65535		
DLMS Version	6		
Quick Object List Download	Disabled	•	
Proposed Conformance	11-block-transfer-with-get-or-read,	$\sim$	
Association Object Version	0	•	
Server Maximum Receive PDU Size	0		
ОК	Cancel		

Association		
Negotiated Conformance	· · · · · · · · · · · · · · · · · · ·	^
Invocation Counter	600	
Security Policy during AA establishment	Authentication and Encryption 🔹	
Encryption Key Type	Visible String 🔹	
Encryption Key	TEST_ENC_KEY_XXX	
Authentication Key Type	Visible String 🔹	
Authentication Key	TEST_AUTH_KEY_XX	
System Title Type	Visible String 🔹	
System Title		
Server System Title Type	Visible String 🔹	
Server System Title		
Use Dedicated Key	False •	
Dedicated Key Type	Random 👻	
Dedicated Key	00000000000000	
Security policy within AA	Authentication and Encryption 🔹	
Use General Global Ciphering	No	
ОК	Cancel	

# **Key Change Test with Meter Explorer**

	^	Name	Value		Time Stamp	
		logical name [A]	0,0,43,0,2,255	0,0,43,0,2,255		
		security_policy [A]	0		20:39:32	
		security_suite [A]	0		20:39:32	
		client_system_title [A]			20:39:32	
	ĸ	ey transfer			×	
	UP.	-				
	K	ey ID (2) authentication key	~			
Security setup(0-0-43-0-2-255)	TE					
0-0-43-0-2-255_logical_name [A]		● Unwrapped Key 🔵 Wrapped K	ey			
0-0-43-0-2-255_security_policy [A]		New key (Plain) MASTER_KEY	_AAA	ASCII	÷	
0-0-43-0-2-255_security_suite [A]		Master Key ENC_AUTH_K	EY_AB	ASCII	÷.	
0-0-43-0-2-255_client_system_title [A]						
0-0-43-0-2-255_server_system_title [A]			Apply	Cano	el	
0-0-43-0-2-255_security_activate [M]	E					
0-0-43-0-2-255_global_key_transfer [M]	~	Key ID				
		Jser shall enter Key ID to specify the	key type.			
Traffic View Event/Data Notification						
🗸 Physical Layer 🔽 Link Layer 🔽 Transport Layer 🔽 Application Layer	v Er	nable Comments Log	To File Clear	P	ause	

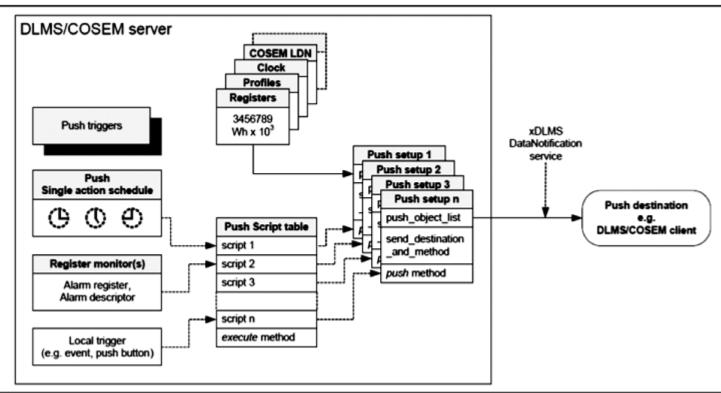
# IS15959-2 & 3 Specific Test Cases

**DataNotification Test** 

#### **Objectives**

- To test data notification process (Periodic & event based) implementation with different push object instances.
- Test the Configuration of Push operation Periodic Push (SM to HES) Utility Message (HES to IHD) Consumer Message (IHD to HES) Periodic Push (SM to IHD) Event Push (SM to HES)

### **Data Notification Service**



#### **Data Notification Service**

## **Test Push with Meter Explorer**

OBJECTLIST	Name		Value	Time Stamp		DataType
GROUP-1	PUSH_OBJECT	0-4-25-9-0-255	Click Here	2017-10-25T10:32:16.68		STRUCTURE
<ul> <li>METER-2 (DLMS-TCP)</li> </ul>						
ASSOCIATION-1						
ASSOCIATION-2						
OBJECTLIST						
GROUP-1						
ASSOCIATION-3						
OBJECTLIST	8					
ASSOCIATION-4	*					
OBJECTLIST						
GROUP-1	K PUSH_OBJECT_0-4-25-9-0-255			i i i i i i i i i i i i i i i i i i i	- • ×	
ASSOCIATION-5	■ PUSH_OBJECT_0-4-25-9-0-255	Name	Value	DataType		
B OBJECTLIST	- L1_Subvalue[0] - L1_Subvalue[1]	L1_Subvalue[0]	LNTER300 PRIDE	VISIBLE_STRING	-	
<ul> <li>METER-3 (DLMS-TCP)</li> </ul>	- L1_Subvalue[1]	L1_Subvalue[1]	0.4.25.9.0.255	OCTET_STRING		
ASSOCIATION-1	L1_Subvalue[3]	L1_Subvalue[2]	7/13/2017 12:49:59 PM	OCTET_STRING	-	
PUSH_OBJECT_0-4-25-9-0-255		L1_Subvalue[3]	000000000000000000000000000000000000000	BIT_STRING	-	
PUSH_OBJECT_0-0-25-9-0-255				Sa	we to File	
Traffic View Event/Data Notification						
Clear						
TimeStamp Type Meter	OBIS	IC	Attribute			
5/10/2017 10:45:59 PUSH METER-3	0,0,25,9,0,255					
5/10/2017 10:45:19 PUSH METER-3	0,0,25,9,0,255					

# IS15959-2 & 3 Specific Test Cases

Firmware Upgrade Test

#### **Objectives**

- Validation of firmware upgrade implementation in meter.
- Instant activation and scheduled activation of image also shall be verified.

### The steps of the image transfer process

- Step 1: (Optional): Get ImageBlockSize;
- Step 2: Client initiates Image transfer;
- Step 3: Client transfers ImageBlocks;
- Step 4: Client checks completeness of the Image;
- Step 5: Server verifies the Image (Initiated by the client or on its own);
- Step 6 (Optional): Client checks the information on the images to activate;
- Step 7: Server activates the Image(s) (Initiated by the client or on its own).

### **Firmware Upgrade Operation with Meter Explorer**

	~	Name		Value	-	Time Stamp
Secondy second	^					
Security setup(0-0-43-0-3-255)	- 88	logical name [A]		0,0,44,0,0,255		20:39:32
<ul> <li>Image transfer(0-0-44-0-0-255)</li> </ul>		image_block_size	: [A]	467		20:39:32
0-0-44-0-0-255_logical_name [A]		image_1 式 Imag	e Transfer			×
0-0-44-0-0-255_image_block_size [A]		image_1	e image file	:\Program Files (x86)\Ka	lkitech\Meter F	xplon
0-0-44-0-0-255_image_transferred_blocks_status [A]		image_1		. a rogram rikos (koo) ala		
0-0-44-0-0-255_image_first_not_transferred_block [A]		image_1 Image	identifier string	type 🖲 ASCII 🔾 [	Decimal	
0-0-44-0-0-255_image_transfer_enabled [A]		image_1 Image	identifier string	TEST_IMAGE		
0-0-44-0-0-255_image_transfer_status [A]		image_1				
0-0-44-0-0-255_image_to_activate_info [A]		image_				
0-0-44-0-0-255_image_transfer_initiate [M]	18	image_1 Read I	mage block size	e from meter 💿 Yes	s 🔘 No	
0-0-44-0-0-255_image_verify [M]		ImageT Image	block size			
0-0-44-0-0-255_image_transfer [S]		UseUnc			т	ransfer
0-0-44-0-0-255_ImageTransferDelay [S]		image_i				Idnsiel
0-0-44-0-0-255_UseUnconfirmedServiceClass [S]		Date time disp	ay format		Register val	ues
0-0-44-0-0-255_image_retry_count [S]	-	O DLMS octet	string 💿 dd/mr	n/yyyy HH:MM:ss.fff	Apply sc	alar and unit
Traffic View Event/Data Notification	_					
🗸 Physical Layer 🔽 Link Layer 🗹 Transport Layer 🔽 Application Layer	V Er	nable Comments	Log T	o File Clear	Pau	ise
	Data					
20 : 40 : 58 METER-1 COSEM OUT DATA						
20 : 40 : 58 ====>Tx METER-1 62 03 80 01 00						

20	:	40	:	58		METER-1	SENDING WRAPPER FRAME	
20	;	40	;	58	====>Tx	METER-1	00 01 00 10 00 01 00 05 62 03 80 01 00	1

20:40:58 METER-1 RECEIVED WRAPPER FRAME

