Review of management attributes in D0.1

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Goal

- Currently, the management attributes in D0.1 are the same as in SIEPON 1904.1-2017, Pkg A.
- However, the new features in 802.3ca require some changes to the existing attributes, as shown on following slides

Branch 0xD6 "identification"

14.4.1.1 Object Context TLV

14.4.1.1.2.1 ObjectInstance field for ONU (0xD6/0x00-00)
14.4.1.1.2.2 ObjectInstance field for PON Port (0xD6/0x00-01)
14.4.1.1.2.3 ObjectInstance field for LLID (0xD6/0x00-02)
14.4.1.1.2.4 ObjectInstance field for UNI Port (0xD6/0x00-03)
14.4.1.1.2.5 ObjectInstance field for Queue (0xD6/0x00-04)
14.4.1.1.2.6 ObjectInstance field for mLLID (0xD6/0x00-06)

- Existing objects still mostly relevant
  - In 802.3ca, ONUs are unaware whether ULIDs assigned to them are multicast or unicast. ONUs are only aware whether ULIDs are bidirectional or unidirectional (downstream only).
  - We should align the LLID and mLLID objects with 802.3ca architecture better.
  - LLID objects are identified by index, but mLLID objects are identified by value. Addressing LLIDs by ONU's local index places an unnecessary burden on the OLT and NMS.
- Do we need any other objects, such as upstream and downstream channels?

Branch 0x07 “basic attributes”

- Sub-groups of Basic Attributes branch
  - ONU management
  - PHY management
  - MAU management
  - MAC management
  - MAC Control management
  - OMP emulation management
  - FEC management
- All basic attributes can be carried over, but many are useless or even irrelevant
  - aLateCollisions, aDuplexStatus, aPAUSEMacCtrlFramesTransmitted
- Each attribute requires a 64-bit counter
- Review and decide if any basic attributes are to be deprecated
- Are there any basic attributes in 802.3.1 that need to be brought over to 1904.4?

Branch 0x09 “basic actions”

- This branch contains just three actions.
  - 14.4.4.1 Attribute acPhyAdminControl
  - 14.4.4.2 Attribute acAutoNegRestartAutoConfig
  - 14.4.4.3 Attribute acAutoNegAdminControl

- All seems OK to keep, but a review is needed

Branch 0xD7 “extended attributes”

- This is a very large branch, with 124 attributes.
- Subgroups of Extended Attributes branch:
  - 14.4.3.1 ONU management
  - 14.4.3.2 Bridging
  - 14.4.3.3 Statistics and counters
  - 14.4.3.4 Alarms
  - 14.4.3.5 Encryption
  - 14.4.3.6 Frame processing
  - 14.4.3.7 Service-level agreements (SLAs)
  - 14.4.3.8 Power saving
  - 14.4.3.9 Optical Link Protection
  - 14.4.3.10 Clock transport
  - 14.4.3.11 UNI management

ONU management subgroup (1/2)

0x00-02	aOnuId	Change needed. ONU has only one MAC address.
0x00-03	aOnuFwVersion	OK
0x00-04	aOnuInfoChipset	OK
0x00-05	aOnuInfoDateManufacture	OK
0x00-06	aOnuInfoManufacturer	OK
0x00-07	aOnuLlidCount	Change needed. LLID is not equivalent to L-ONU anymore.
0x00-08	aOnuPonPortCount	OK, but need to clarify if these are physical or logical PON ports.
0x00-09	aOnuUniPortCount	OK
0x00-0A	aOnuInfoPacketBuffer	OK
0x00-0B	aLlidReportThresholds	Delete. Irrelevant with 802.3ca REPORT format
0x00-0C	aLlidForwardState	Change needed. LLIDs don't combine user traffic, MPCP, and OAM anymore.

ONU management subgroup (2/2)

0x00-0D	aLlidOamFrameRate	Change needed. OAM rate is per ONU now.
0x00-0E	aOnuManOrgName	OK
0x00-0F	aOnuCvcCvsValidity	OK
0x00-10	aOnuUniPortType	OK, but this is a superset of aOnuUniPortCount (0x00-09). Do we keep both?
0x00-11	aVendorName	OK
0x00-12	aModelNumber	OK
0x00-13	aHardwareVersion	OK
0x00-14	aLineRateMode	Need to add new downstream and upstream rates.
0x01-0E	aOnuFwFileName	OK

Bridging (1/2)

0x01-01	aOnuDynMacTableSize	OK
0x01-02	aOnuDynMacAgeLimit	OK
0x01-03	aUniDynMacTable	OK
0x01-04	aUniStatMacTable	OK
0x01-05	aUniPortAutoNeg	OK
0x01-06	aUniAdmissionControl	OK
0x01-07	aUniMinLearnMacCount	OK
0x01-08	aUniMaxLearnMacCount	OK
0x01-09	aOnuMaxLearnMacCount	OK
0x01-0A	aUniLengthDiscard	OK
0x01-0B	aUniFloodUnknown	OK
0x01-0C	aUniLocalSwitching	OK
0x01-0F	aUniMacTableFull	OK

Bridging (2/2)

0x01-10	aOnuMulticastLlid	Change needed. ONU doesn't know whether LLID is multicast or unicast. Just needs to report all provisioned LLID values as (Value, Type, Directionality)
0x01-12	aOnuMaxFrameSizeCapability	OK
0x01-13	aUniMaxFrameSizeLimit	OK
0x01-14	aOnuPortConfig	See note 1 below
0x01-15	aQueueConfig	See note 2 below

1. Currently, *aONUPortCount* tells ONU how many UNI ports to enable and how many LLIDs to register.
   - In 802.3ca, LLIDs are directly provisioned by NMS, so no LLID count is needed.
   - The setting and querying of UNI port count can also be done using basic attribute *aPhyAdminState* (0x07/0x00-25) and basic action *acPhyAdminControl* (0x09/0x00-05). Do we keep both methods?

2. Queues need to be associated with either LLID or UNI. (There is a mistake in 1904.1) Need to describe what happens to queues when the LLID is deallocated or UNI is disabled.

Statistics and Counters (1/3)

0x02-01	aCountRxFramesGreen	OK
0x02-02	aCountTxFramesGreen	OK
0x02-03	aCountRxFrames2Short	OK
0x02-04	aCountRxFrames64	OK
0x02-05	aCountRxFrames65to127	OK
0x02-06	aCountRxFrames128to255	OK
0x02-07	aCountRxFrames256to511	OK
0x02-08	aCountRxFrames512to1023	OK
0x02-09	aCountRxFrames1024to1518	OK
0x02-0A	aCountRxFrames1519	OK
0x02-0B	aCountTxFrames64	OK
0x02-0C	aCountTxFrames65to127	OK
0x02-0D	aCountTxFrames128to255	OK
0x02-0E	aCountTxFrames256to511	OK
0x02-0F	aCountTxFrames512to1023	OK
0x02-10	aCountTxFrames1024to1518	OK
0x02-11	aCountTxFrames1519	OK

Statistics and Counters (2/3)

0x02-12	aQueueDelayThr	OK
0x02-13	aQueueDelayValue	OK
0x02-14	aCountFramesDropped	OK
0x02-15	aCountOctetsDropped	OK
0x02-16	aCountOctetsDelayed	OK
0x02-17	aCountUsOctetsUnused	OK
0x02-1D	aPonOptMonitTemp	OK
0x02-1E	aPonOptMonitVcc	OK
0x02-1F	aPonOptMonitBias	OK
0x02-20	aPonOptMonitTxPower	OK
0x02-21	aPonOptMonitRxPower	OK
0x02-22	aCounterRxFramesY	OK
0x02-23	aCounterTxFramesY	OK
0x02-24	aCounterTxOctetsG	OK
0x02-25	aCounterRxOctetsY	OK
0x02-26	aCounterRxOctetsG	OK
0x02-27	aCounterTxOctetsY	OK

Statistics and Counters (3/3)

0x02-28	aCounterTxFramesL2Unicast	OK
0x02-29	aCounterTxFramesL2Multicast	OK
0x02-2A	aCounterTxFramesL2Broadcast	OK
0x02-2B	aCounterRxFramesL2Unicast	OK
0x02-2C	aCounterRxFramesL2Multicast	OK
0x02-2D	aCounterRxFramesL2Broadcast	OK
0x02-2E	aOnuCounterNumber	OK
0x02-2F	aCounterRxFramesL2CP	OK
0x02-30	aCounterRxOctetsL2CP	OK
0x02-31	aCounterTxFramesL2CP	OK
0x02-32	aCounterTxOctetsL2CP	OK
0x02-33	aCounterDiscardFramesL2CP	OK
0x02-34	aCounterDiscardOctetsL2CP	OK
0x02-35	aCounterL2TxErrors	OK
0x02-36	aCounterL2RxErrors	OK
0x02-37	aCountFramesOverLimitDroppedUni	OK
0x02-38	aCountOctetsOverLimitDroppedUni	OK

New statistics attributes

- Several additional statistics attributes may be needed in 1904.4:
  - Counters for jumbo frames
  - Counters related to fragments
  - Counters related to envelopes
  - Counters related to separate channels in 50G-EPON

Alarms

0x03-01	aAlarmPortStatThr	OK
0x03-02	aAlarmLlidStatThr	OK
0x03-03	aAlarmStatusControl	OK

- An alarm is attached to a specific statistics counter.
- Alarms are triggered by counter value exceeding the high threshold and cleared when the value falls below the low threshold.
- Do we need an ability to trigger an alarm on low threshold and clear it on high threshold?
  - Instead of “high” and “low” thresholds, use “set” and “clear” thresholds and allow the “set” threshold be greater or less than the “clear” threshold.

Encryption

0x04-01	aEncryptionKeyExpiration	See the note below
0x04-02	aEncryptionMode	See the note below

- 1904.1, Pkg A uses zero-overhead encryption. The 802.3ca standard added the necessary fields to envelope header to also support zero-overhead encryption.

- Many operators now inquire about 256-bit keys. Do we need an attribute to tell the ONU the key size, or we make the selection a part of key exchange?
- In SIEPON, encryption mode and encryption key is per L-ONU (LLID).
  - Consumes too much resources in a physical ONU, especially with 256b key
  - Complicates dynamic provisioning of ULIDs
  - In 802.3ca, order of LLIDs within one burst is not predetermined. So, the OLT cannot pre-load keys ahead of time.
- We should specify encryption using one key per ONU, not per LLID.

Frame Processing

0x05-01	aRuleSetConfig	OK
0x05-02	aRuleCustomField	OK
0x05-03	aRuleTpidCAlter	OK
0x05-04	aRuleTpidSAlter	OK
0x05-06	aRuleTpidIAlter	OK
0x05-07	aRuleTpidBAlter	OK

Service-Level Agreements

0x06-01	aRateLimitBroadcast	
0x06-04	aQueueCIR	
0x06-05	aFecMode	Change is needed to indicate new data rates. Default should be set to *enabled*. Also, FEC should be per ONU, not per LLID.
0x06-06	aQueueEIR	
0x06-07	aQueueColorMarking	
0x06-08	aQueueRateLimiterCap	
0x06-09	aCouplingFlag	

Power Saving

0xFF-FF	aOnuPwrSavingCap	Change may be needed to add new power saving modes in a multi-channel 50G-EPON.

- Pending proposals on power saving modes

Clock Transport

0x07-01	aClockTranspCapab	OK
0x07-02	aClockTranspStatus	OK
0x07-03	aClockTranspTransfer	OK
0x07-04	aClockTranspPropagParam	OK
0x07-05	aClockTranspRtt	OK

UNI Management

0x08-20	aEeeStatus	What happens when *aEeeStatus* is set to enabled, but the UNI does not support the EEE function?
0x08-21	aPoeStatus	What happens when *aPoeStatus* is set to enabled, but the UNI does not support the PoE function?
0x08-22	aMediaType	Not clear what specific difference this attribute makes at the ONU. Can it be set in conflict with *aPhyType* (0x07/0x00-20)?

- All these attributes are R/W and are used to query or set the status of UNI.
  - No description of what happens if the given function is not supported, but the attribute is written to enable it.

- There are no attributes in 1904.1 that query the relevant capabilities of a given port.
  - Are there any basic attributes in 802.3.1 that allow to query the relevant capabilities?

Optical Link Protection

0x09-00	aOnuProtectionCapability	OK
0x09-01	aOnuConfigProtection	OK
0x09-02	aOnuConfigPonActive	OK
0x09-03	aONUConfigHoldoverPeriod	OK

- In multi-channel 50G-EPON, an ONU has a capability to distinguish fiber cut from laser or receiver failure by comparing signals on two channels.
  - Failure of a single channel does not need to trigger protection switching, but needs to alarm the OLT

- In 802.3ca, the Channel Control Protocol provides capabilities for the OLT to query, enable, or disable individual channels in an ONU.
- ONU may also use CCPDU for alarms:
  - "*Furthermore, the ONU may send an unsolicited CC_RESPONSE CCPDU to notify the OLT about any local changes in the channel status, including imminent transceiver element (transmitter and/or receiver) failure, local channel disabling, power failure and resulting channel shutdown*."

Attribute Branch Allocations

- The 1904.4 uses the same OUI and same TLV leaf values as 1904.1, Pkg A.
- However, for many attributes, the format and/or the behavior is different.
- We need to allocate new branch codes to avoid confusing the ONU

Proposed New Branch Allocations

Branch code (hex)	Scoped under OUI (hex)	Branch Designation	Specified in Standard
03	n/a	Basic Objects	IEEE 802.3.1-2013
04	n/a	Package Identification	IEEE 802.3.1-2013
07	n/a	Basic Attributes	IEEE 802.3.1-2013
09	n/a	Basic Actions	IEEE 802.3.1-2013
0A	n/a	Notifications	IEEE 802.3.1-2013
37	C4-E0-32	Extended Object Identification	IEEE 1904.1-2017 (Package C)
A7	58-D0-8F	VLC Service Interface Counters	IEEE 1904.2/D3.0
A8	58-D0-8F	VLC Rule Counters	IEEE 1904.2/D3.0
B6	90-82-60	Extended Object Identification	IEEE 1904.1-2017 (Package B)
B7	90-82-60	Extended Attributes	IEEE 1904.1-2017 (Package B)
B9	90-82-60	Extended Actions	IEEE 1904.1-2017 (Package B)
C7	C4-E0-32	Extended Attributes	IEEE 1904.1-2017 (Package C)
C9	C4-E0-32	Extended Actions	IEEE 1904.1-2017 (Package C)
D6	58-D0-8F	Extended Object Identification	DPoE 2.0 and IEEE 1904.1-2017 (Package A)
D7	58-D0-8F	Extended Attributes	DPoE 2.0 and IEEE 1904.1-2017 (Package A)
D8	58-D0-8F	Programmable Counters	DPoE 2.0 and IEEE 1904.1-2017 (Package A)
D9	58-D0-8F	Extended Actions	DPoE 2.0 and IEEE 1904.1-2017 (Package A)
DA	58-D0-8F	Extended Object Identification	IEEE 1904.4/D0.x
DB	58-D0-8F	Extended Attributes	IEEE 1904.4/D0.x
DC	58-D0-8F	Programmable Counters	IEEE 1904.4/D0.x
DD	58-D0-8F	Extended Actions	IEEE 1904.4/D0.x

Thank You