DNP-UG Update Webinar

NOVEMBER 12, 2020

Ronald Farquharson
DNP Users Group, President and COO
Mount Victoria Consulting

Webinar is being recorded

Outline – Part 1 – Core Program

- Introductions
- COO and Director Update
- Technical Committee
- Cyber Security Task Force
- Test Procedure Subcommittee
- Test Management Committee
- Wrap up
- Q&A

Chat room is being facilitated

Speakers at this Webinar

- Andrew West, Subnet
  - Chair, Technical Committee
  - Chair, Test Procedure Subcommittee
- Grant Gilchrist, Tesco Automation
  - Technical Editor, Cyber Security Task Force
  - Primary author – AN2018-001 – DNP3 Profile for DER Communications
  - Primary author – Secure Authentication Version 5
- Ronald Landheer-Cieslak, Eaton
  - Chair, Cyber Security Task Force
  - Chair, Test Management Committee
  - Vice-Chair of Technical Committee and editor of IEEE 1815 update
- Ronald Farquharson, Mount Victoria Consulting
  - President and COO

Webinar is being recorded

Outline – Part 2 – Member Engagement

- Q&A on our current programs
- Input on future developments
- Suggestions for UG offerings and services
  - E.g. Priority webinar topics
- Other feedback

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Summary – Director's Update

- Great progress with:
  - Outstation and Master Station Test Procedures
  - Conformance Test Review (CTR) program
  - SAv6 and AMP
  - IEEE 1815™ update
- IEEE 1815 schedule:
  - Was publishing Q4, 2021
  - Now extended to Q4, 2022
  - Full draft to the IEEE WG – Q2 of 2021
- Initiatives and Programs:
  - Strategic and Funding
  - Current and Pending
  - Proposed
  - Possible
  - New ideas
- Impact of volunteer effort
- Review of the 2020 Fee Structure

Four (Very Active) Committees and Task Forces = 2-3 Meetings Per Week = ~4000 hour per year of volunteer time

Users Group Initiatives – Strategic and Funding

- Technical Committee – Virtual F2F – Nov. 2 – 6th – 6 hours per day
- IEEE 1547.3™ – Guide for Cyber Security for DER Devices – IEEE WG S13
- MESA – Test and Certification WG and PNNL
- Ongoing engagement – IEEE PSCCC – WG P2 and SG P3
- IEEE Sharing Agreement
- NEMA – Device Profile Developments
  - NREL, NIST, DOE
- IEEE P1815.2 – DNP3 Profile for DER
- IEEE C37.240 – Cyber Security for Substations
- Engaging outside cyber security experts for input of SAv6 and AMP
- EPRI and Utility - Funding discussions - 2021 Cyber Security Developments

IEEE EPRI ELECTRIC POWER RESEARCH INSTITUTE MESA Open Standards for Energy Storage dnp

Users Group Initiatives – Current and Pending

- Outstation Test Procedures
- Master Station Test Procedures
- SAv6
- AMP
- IEEE 1815 Update
- Device Profile Guide
- Conformance Test Review (CTR) process updates
  - Process enhancements
  - Discussions with an ITF
  - CTR Reviewers Guide
- On-going website enhancements including Forum reboot

The DNP-UG acknowledges and thanks Salt River Project and EPRI for funding and support of the SAv6 and AMP Development Program

Current / Pending **Proposed** **Possible**

Users Group Initiatives – Proposed / Discussions

- DNP3 Profile for DER – Test Procedures (review EPRI work)
- DNP3 Profile for DER – addition to our CTR process
- New device profiles, test procedures, XML configuration (DP) updates
- Master station – addition to our CTR process or other conformance solution
- SAv6 – Test Procedures
- AMP Test Procedures (three parts - outstation, master and authority)
- SAv6 and AMP – Interop demonstration – fall 2021
- SAv5 – addition to our CTR process or other conformance solution
- SAv6 and AMP – addition to our CTR process or other conformance solution

Pending **Proposed** **Possible**

Users Group Initiatives - Possible

- Webinars / training (e.g. Security topics, CTR, Device Profile)
- New Technical Issue process
- New White Papers (e.g. Cyber security, profiles,using XML Device Profile to assist configuring Master Stations, using GOOSE with DNP LAN)
- Definition of new configuration methods and tools using DNP3 Device Profile
- Utility and Supplier Advisory Councils

Pending **Proposed** **Possible**

Impact of Volunteer Effort* for the CSTF

- Total funded time is ~ 570 hours
- Total volunteer time is ~ 500 + 375 + 800 ~1675 hours
  - CSTF meets 4 times monthly for approximately 8 hours per month with ~ 4.5 people (mostly volunteer, one person paid) ~ 500 hours. Leading industry experts.
  - Additional effort to coordinate with the IEC TF on IEC 62351 Part 5 = 6 hours per month with 3.5 people (all volunteer) ~ 375 hours. Leading industry experts
  - Additional volunteer time beyond the above (CSTF, TC, other) ~ 800 hours
  - Total volunteer time is ~ 500 + 375 + 800 ~1675 hours
- Total development effort ~ 2,245 hours (just over $53 per funded hour)

Three to one Leverage on Funded Hours

* - Figures are as of July 2020. Efforts (funded and volunteer) continue apace.

"The DNP Users Group provides higher value to the industry than many organizations with fees at the $20,000 level", well known industry thought leader / speaker and senior manager at a large supplier.

Fee Change Summary – Background 1 of 2

What's Happening?

- The needs of the industry exceed the Users Group capacity on a purely volunteer basis.
- We have undertaken many new or re-booted programs and initiatives such as Conformance Test Review and security.
- Active members (really smart and dedicate people) are volunteering more than ever.

Why Increase the Fees?

- Our old volunteer-only model is unsustainable.
- Leadership has concluded that the best model is a hybrid model with part-time paid staff and lots of volunteers. Staff are paid at discounted rates and must also volunteer.
- New model was approved: AGM in Feb. 2019.
- Cash flow details were shared at the Information Sessions
- This model is similar to other groups such as UCAIug for the same reasons.

Did you Engage with the Members?

- Absolutely, with emails, home-page announcements, surveys, interviews, and information sessions.
- We have incorporated many/most suggestions.
- We have been open and transparent.

How Have Members Responded?

- Some were immediately supportive.
- A few were hesitant or opposed.
- All-member vote approved - >80%

What is the New Fee Structure?

- See new fee table
- See also the accompanying notes

When did the increase take effect?

- January 2020

"I understand the need and will have no problem paying higher (DNP Users Group) membership fees, assuming that the value continues to be there", Engineering Manager at a large North American utility.

Fee Change Summary – Background 2 of 2

What is the Value of the Users Group?

- Users Group members continue to invest 3000 to 4000 hours of volunteer time per year because they understand the importance and value of what they are doing.
- Primary areas of focus are:
  - Cyber security
  - Interoperability including Conformance Test Reviews & test procedures etc.
  - Advancing new functionality
  - Updating the standard for clarity and errata
- This webinar material contains value propositions for utilities, suppliers and consultant/integrators.
- The bottom line: the Users Group provides strong value to the industry by addressing interoperability risk while adding functionality like security provisions, the new DER profile and tool support (e.g. XML schema).
- Expanded value propositions are planned.

What Happens if the Members Don't Renew?

- We have tried very hard to make the volunteer-only model work and it is unsustainable. If we are to continue providing high-value services like Conformance Test Reviews and on-going developments such as cyber security, expanded funding is needed.

How did you this arrive at this fee structure?

- Value-based comparison to other similar groups.
- Member survey and interviews
- Information sessions for members.
- Tested multiple versions for feedback. Current fee structure is Ver. 6.0

Could There Be Changes in the Future?

- Yes, we have worked diligently to get to right balance on fees. However, with more input from members and clarity on cash-flow, additional adjustments to fees may be needed. See Note 6 on Slide 5.
- Yes, cost of living adjustments may be necessary. See Note 5 on Slide 5

What's the next step?

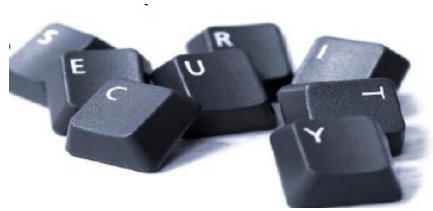
- If you have not renewed, please do so as soon as possible

Opportunities and Challenges

- Join one of our 4 operating committees/task forces
- Promote the UG in your companies
- New Directors – Technology, Marketing
- Fee income has dropped since the UG offered a 90-day deferral to July 31st
  - **October membership income is *only* 1/10th of target**

Why DNP-UG Membership?

- Membership fees provide essential support for the UG operations and programs thereby enabling the work of our committees and task force(s). Our dedicated and smart volunteers provide thousands of hours of effort per year.
- The UG is continuing with an ambitious combination of developments and initiatives including cyber security, conformance assurance, test procedures and a major update to the IEEE 1815 standard.
- Opportunity to contribute and provide input to our work.
- Remain in compliance with the UG's document sharing policies.
- Please join or renew today. We can't do this without YOU!
- https://www.dnp.org/Join-Purchase/Purchase-New-Membership



Back up material

Member Fee Structure 2020

See Important Notes on following slides

DNP Users Group Member Fee Structure 2020			
Category No. (1) (4)	**Member Category**	**Annual Fees**	**User Accounts (6) (7)**
1	Individual - See note (5)	$400	1
2	Water Utility	$500	5
3	Small Muni/Coop (3)	$500	5
4	Large Muni/Coop (> $500 million) (3)	$1,000	10
5	Small utility (< $1 billion) (3)	$1,000	5
6	Large utility (> $1 billion) (3)	$3,000	10
7	Micro vendor (0-$1 million) (2)	$500	1
8	Small vendor (1-$20 million) (2)	$1,000	3
9	Medium vendor ($20 to 100 million) (2)	$3,000	5
10	Large Vendor (> $100 million) (2)	$6,000	10
11	Vendor - revenue not declared	$6,000	10
12	Academic (Student / Research) (5)	$1	1
13	Emeritus Member (5)	$0	1
Option - 1	CTR Access for Members (10) Addiitional fees apply	$1,000	
Option - 2	CTR Access for Non-Members (11) Addiitional fees apply	$7,000	

The new fees became effective January 1, 2020

Notes for 2020 Fees (1)

1. The UG expects that members will correctly determine their membership category according to the criteria provided in the Fee Table.
2. Membership categories for vendors and consultants/integrators are established based on the annual revenues that are associated with the use of or engagement with DNP3. A primary determinant would be the customer procurement specification and whether IEEE Std 1815TM or DNP3 has been specified as a requirement. In that case, the applicable revenues would apply in determining the member fee regardless of whether the devices themselves utilize DNP in that instance. Revenues that are not associated with DNP would not apply. This is viewed to be the fairest proxy for the number of devices supplied or deployed that use DNP.
3. Membership categories for utilities are based on straight annual revenue.
4. Organizations may choose a category based on plant, business unit or corporation revenues.
5. Individual, academic and emeritus members will be listed by their name (and not company or institution) on the membership lists. Corporate members will be listed by their company name.

Note: California nonprofit mutual benefit Corporation, operating pursuant to United States IRS code 501(c)(6)

Notes for 2020 Fees – (2)

6. The DNP-UG retains Intellectual Property rights (e.g. copyrights) to all documents developed by the UG. Individual, academic and emeritus members are granted individual access to DNP-UG documents for individual use (only). In this case documents may not be copied or distributed to others.
7. Corporate members are granted multi-user access based on the number of Users Accounts included with their membership fee. Documents may be copied or distributed within the member company according to the number of User Accounts. For example, a medium vendor member may use up to five separate copies of the documents (total).
8. The one exception to the document access limit is AN2018-001 where commercial use of the DER document (only) is granted when an individual fee has been paid ($300) until the structure is in place for individual document sale.
9. The Directors have approval to raise member fees, if necessary, per the US Social Security Cost-of-Living Adjustments at: www.ssa.gov

Notes for 2020 Fees – 3 of 3

10. Optional annual fee for vendors that are members that provides access to the Conformance Test Review (CTR) process. Additional service fees apply.
11. Optional fee for vendors that are NOT members that provides access to the Conformance Test Review (CTR) process. This fee applies for each CTR project. Additional service fees apply.
12. There is a separate Partner Program available for utilities and other groups that wish to support specific programs and initiatives.

Webinar is being recorded

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- Introductions
- COO and Director Update
- **Technical Committee – Andrew West**
- Cyber Security Task Force
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DNP Technical Committee 2019/2020 Activities (12 months to Nov 2020)

ANDREW WEST, CHAIR, DNP TECHNICAL COMMITTEE
REGIONAL TECHNICAL DIRECTOR, SUBNET SOLUTIONS

DNP TC Activity Summary

- Publications
  - 1 Technical Bulletin published, several more in the pipeline

- Work in Progress
  - Protocol Specification
  - Test Procedures
  - Secure Authentication
  - Device Profile documentation

Committee Structure

- Technical Committee (TC)
  - Responsible for all technical documentation and input to IEEE 1815
- Test Procedure Subcommittee (TPSC)
  - Responsible for development and maintenance of DNP3 Test Procedures
  - A subcommittee of the Technical Committee
- Cyber Security Task Force (CSTF) (was SATF: Secure Authentication Task Force)
  - Ad-hoc group responsible for revising DNP3-SA
    - Collaborating with parallel IEC committees
- IP Task Force

Publications

- TB2020-001

  Obsoletion of the file authentication mechanism

  - Declares that the optional “File Authentication” mechanism introduced in TB2000-001 is now obsolete and shall not be used for new designs
    - The AUTHENTICATE_FILE command and File-Control–Authentication object (g70v2) are declared obsolete
      - The authentication object transferred username and password information in clear text
      - The returned numeric authentication key was used in subsequent file open or delete commands
      - Zero is now the only permitted value of the authentication key
  - DNP3-SA shall be used for secure access to files through DNP3

Publications

- TB2020-002 (release pending)

  Requiring devices to be configurable to disable cold restart and warm restart
  - Conformant outstations are required to support Cold Restart
  - Announces a new conformance requirement:
    - Outstations shall be configurable to ignore the Cold Restart and Warm Restart functions
    - Outstations shall not support these functions in broadcast commands
    - The outstation test procedures will verify that these functions can be disabled
  - Users should disable the functions to reduce the cybersecurity attack surface in systems that do not require their operational use

Publications

- TB2020-003(?) (release pending)

  Support of the Assign Class command requires support for all classes
  - A clarification of the specification
  - New outstation test procedures for Subset Level 3 verify this support
  - The specification previously required support for this function for Subset Level 3, but did not indicate a requirement for support of all Classes
  - An additional functionality will allow data to be assigned to no class
    - "Assigned to no class" ≡ Removed from Class 0 responses & all event reporting disabled
    - Support for this will be optional, with masters required to be able to NOT use it

Publications

- TB2016-001a (release pending)

  Revision to description of Error IIN flags published in 2016

  - Requires error reporting if an outstation cannot return requested data
    - Some edge cases defined with recommended behaviours
      - Outstations that have none of the requested data
        - Cases for static and event data, including outstations that cannot report events
      - Outstations that have only some of the requested data
        - Behaviour when the request identifies a superset of data that incudes all data actually available
  - Clarifications triggered by considering various use cases during test procedure review: Some cases are not covered in the existing specification

Work in Progress: TC

- Update of IEEE 1815 (DNP3)
  - Inclusion of Technical Bulletins published since the release of IEEE 1815-2012
  - Other clarifications, error corrections, and updates
    - Integration and review of these updates is progressing steadily
    - Aims to enhance clarity and reduce tutorial material
- Some clarifications being driven by the extension of the test procedures to include masters and Subset Level 3 outstations
- Introducing the concept of a “preferred variation”

Work in Progress: TC

- Major revision to format of the Parsing and Interoperability sections
- DNP3-SAv6 in development by the CSTF
- Major revision of the IP section of the specification
  - Special 2-day “Task Force”-style Face-to-Face meeting at end of January 2020
  - Removal of 1990’s-era tutorial material
  - Revision of multi-master compatibility guidelines
- Guideline for vendors for creating the DNP3 Device Profile under development (first draft ready for review)

Work in Progress: TPSC

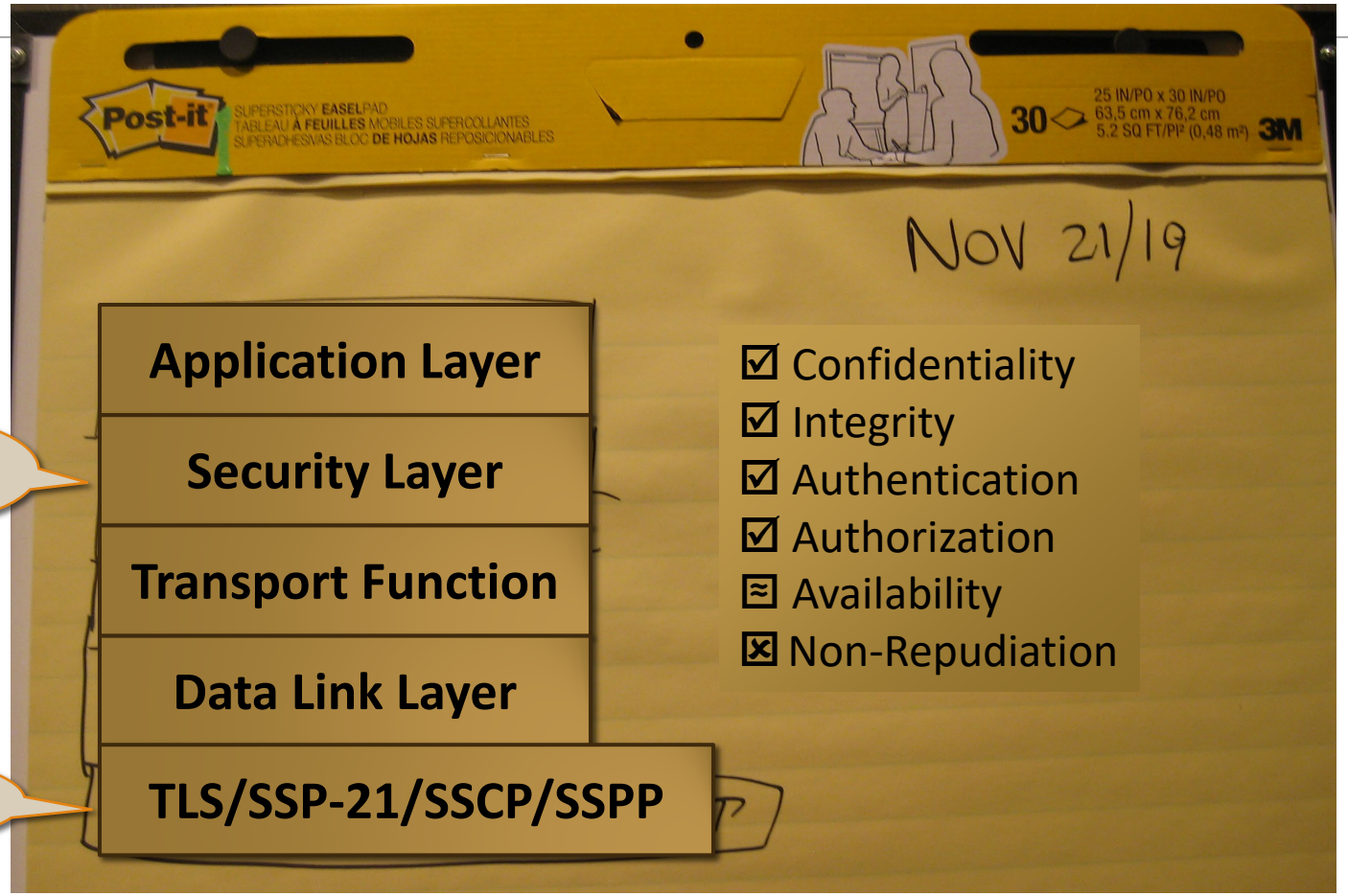
- Development of Master Station Test Procedures
  - A three-part test definition program
    - Parts 1 & 2 published 2018 & 2020
    - Part 3
      - TC review commenced during annual TC meeting, November 2020
      - Review continuing during scheduled TPSC meeting timeslot
- Revision of Outstation Conformance Test Procedures
  - Roll up of Subset Levels 1 & 2 with addition of Subset Level 3
  - TC review completed during annual TC meeting, November 2020
    - Rework pending from TC decisions

Work in Progress: CSTF

- Cyber Security Task Force (CSTF):
  - Number of issues in common with IEC 60870-5-7 have been identified
  - Members are involved with DNP3, IEC 62351-5, and IEC 60870
    - Task Force is open to non-Users Group members
  - TB2019-001 was a work product of the SATF
  - Major work items are development of DNP3-SAv6 and AMP
    - SAv6 will be significantly easier to use and manage than SAv2 or SAv5
      - No more key management
    - Authorization Management Protocol (AMP) replaces DKMP

The DNP3-SAv6 CI(AA)A “Triad”

Snapshot from the DNP Technical Committee Face-to-Face Meeting, 21 November 2019



New

Compatible

Be a DNP3 Contributor!!

- Join the DNP Technical Committee
  - Telecons every second Wednesday 5-8 p.m. North American Eastern Time
  - Annual week-long face-to-face meeting (COVIDEO meeting this year….)
  - Any DNP Users Group member is welcome to attend as a guest and contribute to the discussion, or just listen in and learn
  - Add your name to the dnptech mailing list, used by TC members to discuss current work, other DNP3-related issues, distribute meeting minutes, etc.
    - To join, send an email entitled “Join dnptech mailing list” to chair_tech@dnp.org
  - Also: TPSC, CSTF, TMC have separate meeting schedules
    - More opportunity to learn and contribute

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DNP3 Security Update

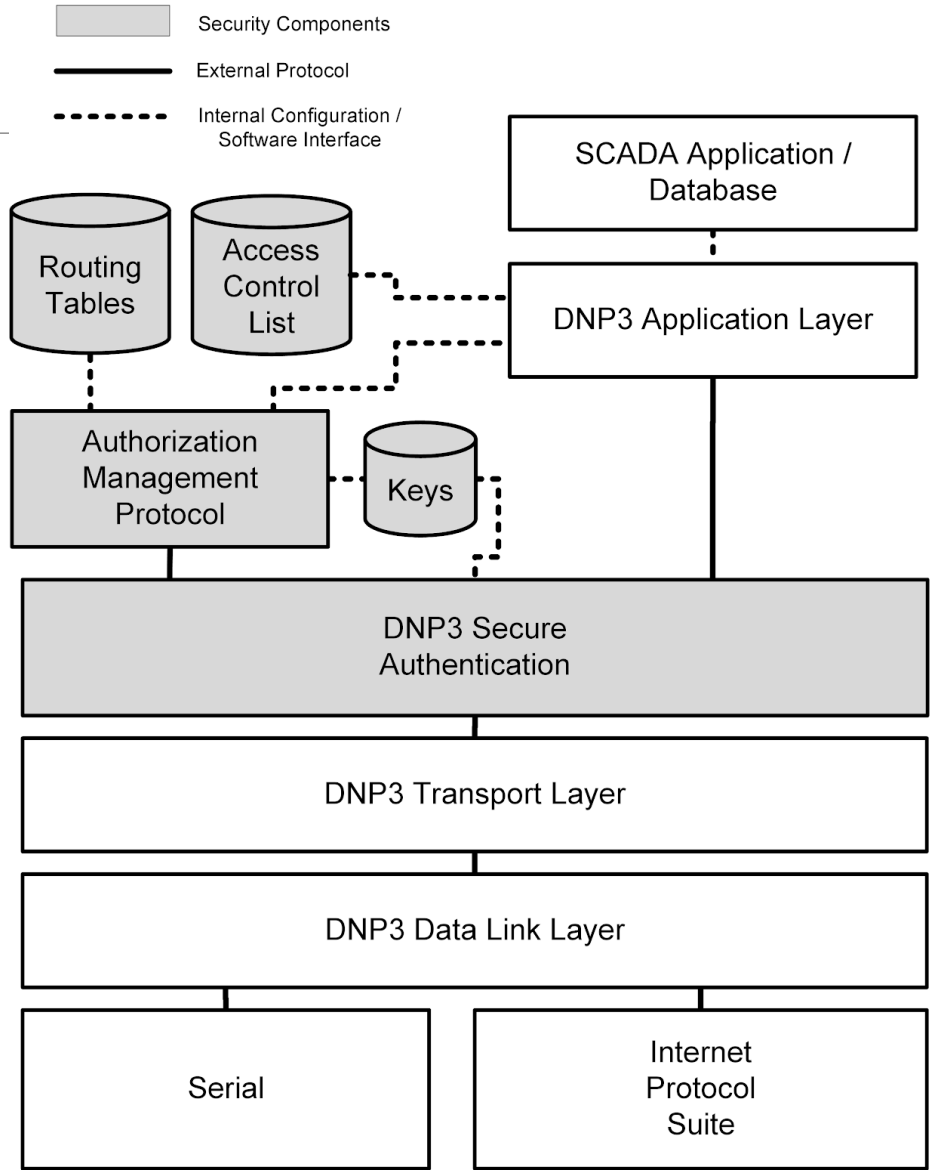
DNP USER'S GROUP MEETING
NOVEMBER 12, 2020

Grant Gilchrist, P. Eng.
Systems Engineer, Grid Modernization
Tesco Automation

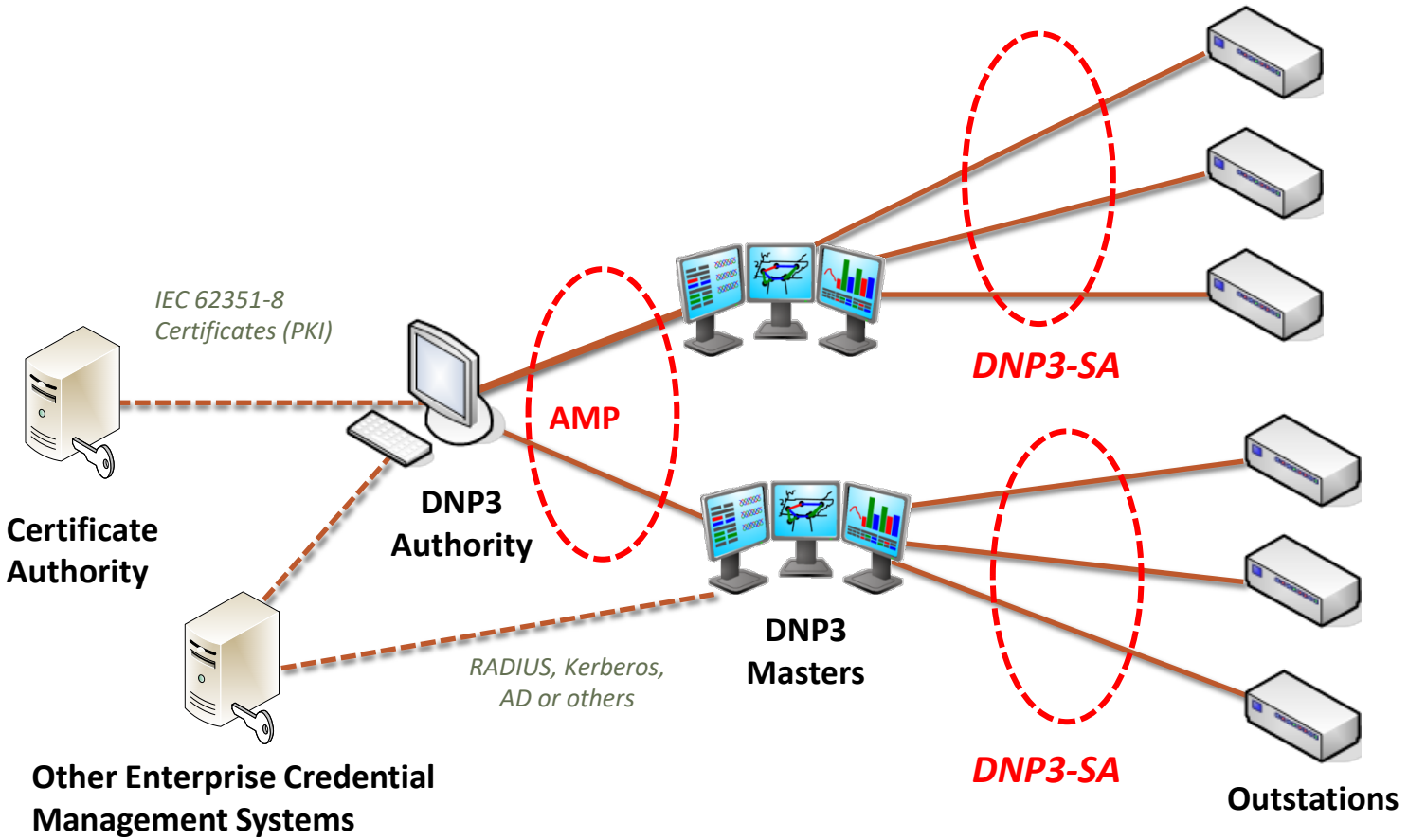
Review

The latest revision to DNP3 security will consist of:

- DNP3-SAv6
  - Protocol between master and outstation
  - Provides secure session
  - Device enrollment with limited human involvement and no pre-configured keys
- Authorization Management Protocol (AMP)
  - Formerly called DKMP
  - Protocol between Authority and all devices
  - Routed through data concentrators so no need for WAN
  - Authorizes which devices are permitted to communicate
  - Can perform just network access authorization or Role-Based Authorization Control



Integration with the Enterprise



Benefits and Features

DNP3-SAv6

- Authentication, integrity and RBAC between devices at application layer
- Uses Hashed Message Authentication Code (HMAC)
- Now also supports encryption
- Defined as separate layer that can be used for other protocols
- Elliptical curve algorithms to minimize processing power
- Simplified procedures and new algorithms in this version
- Can be used with AMP or other PKI

AMP

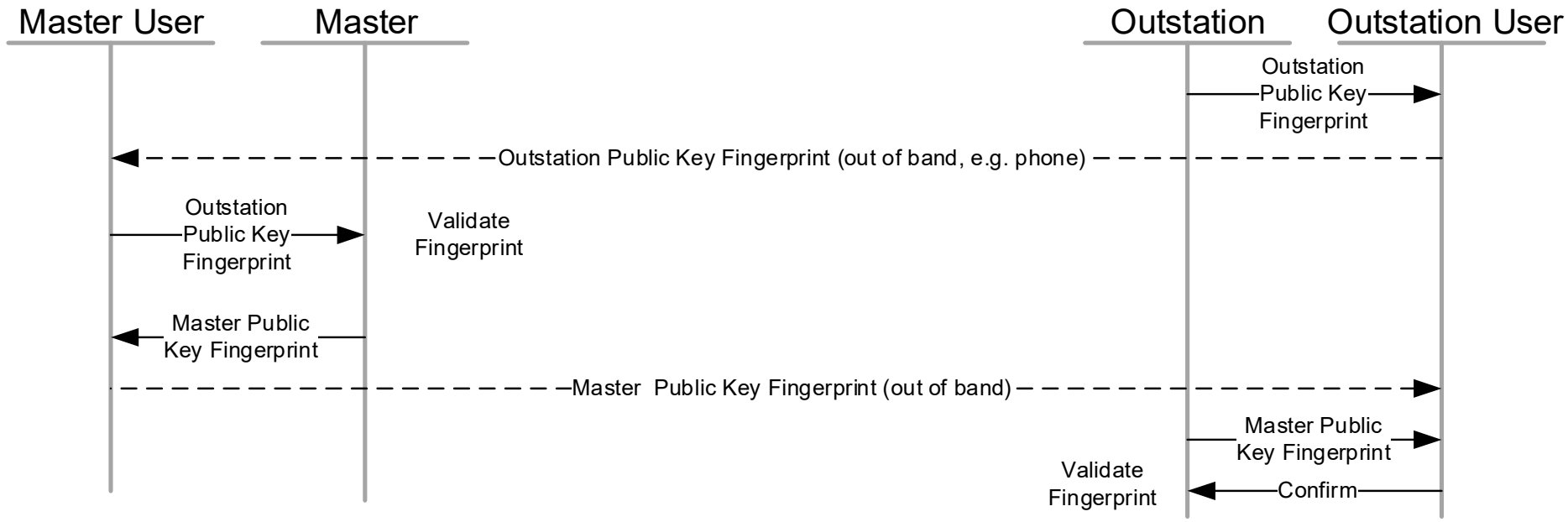
- Central authorization for both IP and hierarchical serial networks
- Promptly revokes authorization and/or privileges through RBAC
- Helps mitigate Ukraine-style attacks by regaining control of network quickly
- Allows devices to generate their own keys, avoiding human interaction
- Accommodates redundant connections, masters and authorities
- Prevents tunneling of non-DNP3 messages

DNP3-SAv6 Progress

- Draft spec was released at the beginning of the year
- Much time spent aligning with IEC 62351 Part 5
  - Will use the same technology to secure the IEC 60870-5 protocol
  - Marco Grechi from Italy is editor, working on project with ENEL
  - Committee Draft release in first quarter
  - Several hundred comments from IEC members
- Two significant vulnerabilities identified:
  - The method of using a Low-Entropy Shared Secret (LESS) allows a brute force attack
  - State machines for Update Key Change and Session Key Change could block each other, permitting a denial-of-service attack

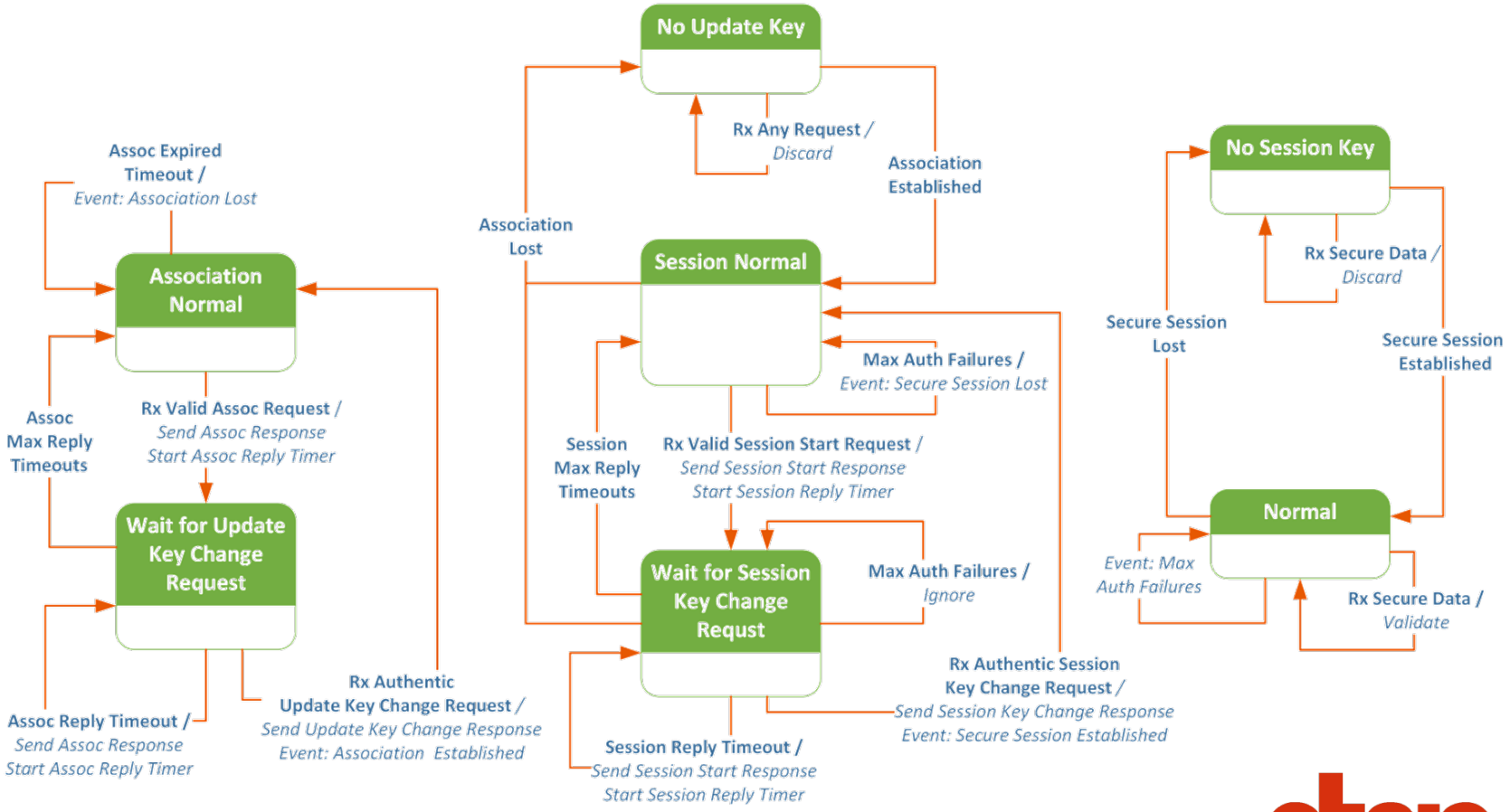
Replace LESS with Field Authorization

- Certificates of master and outstation may be **self-signed**
- Permits installation of devices **without connection to an Authority**
- Humans exchange **public key fingerprints** (BIP-39 mnemonic word code)
- They **do not need to handle** certificates or keys
- No need for complex user interface at outstation



New State Machines to Prevent DOS Attack

- Three separate "machines"
  - Association Establishment
  - Session Initialization
  - Secure Data Exchange
- Three sets of messages
- Three states
- Run simultaneously
- Prevents one process from blocking the other if valid keys already exist

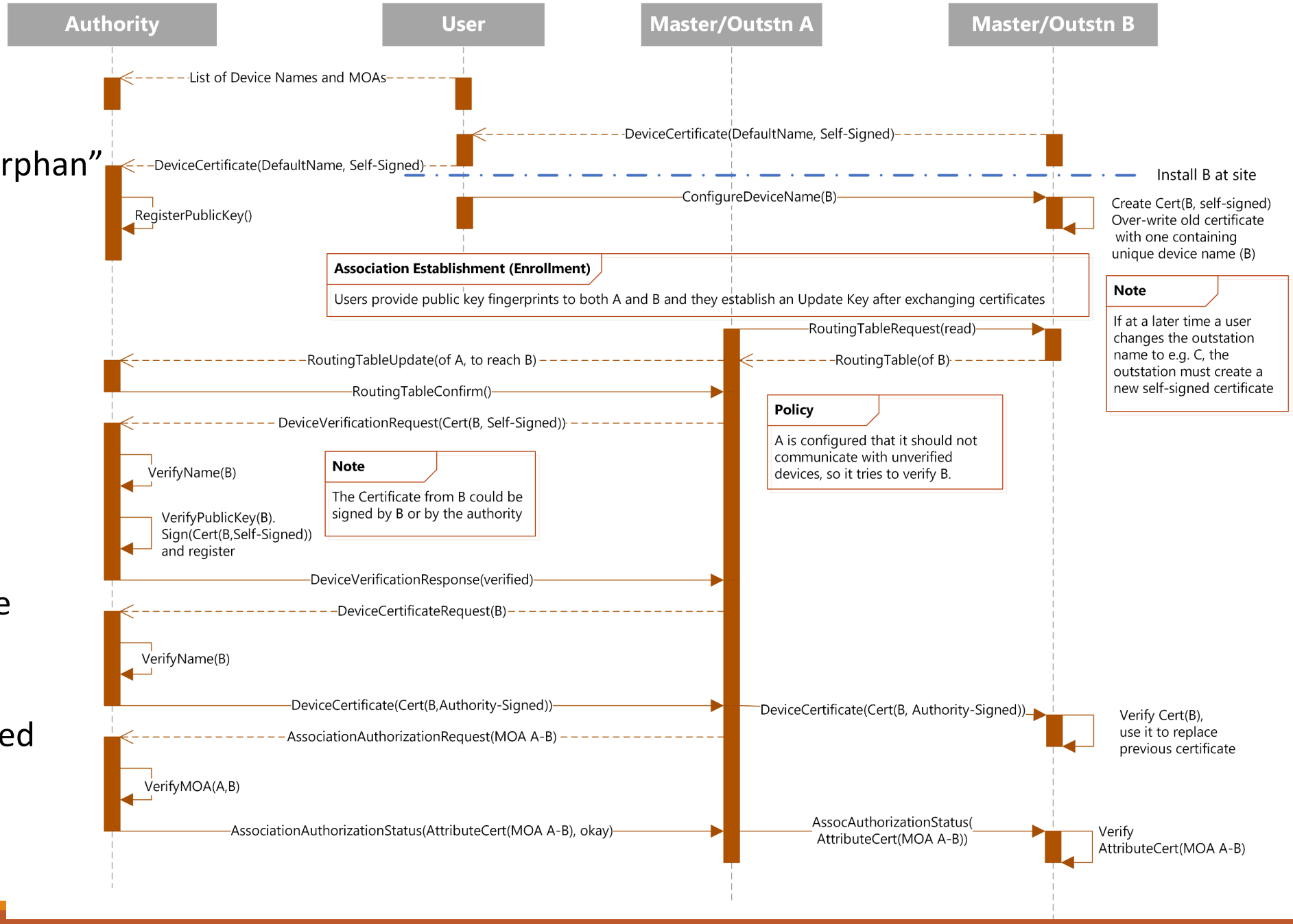


AMP Progress

- 20 use cases, 7 policies, 15 parameters
- Message types defined in ASN.1 format:
  - AssociationAuthorizationRequest
  - AssociationAuthorizationStatus
  - DeviceCertificateRequest
  - DeviceCertificate
  - DeviceRevocation
  - DeviceStatus
  - DeviceVerificationRequest
  - DeviceVerificationResponse
- Routing Messages defined
  - RoutingTableRequest
  - RoutingTable
  - RoutingTableConfirmation
  - RoutingTableUpdate
  - RoutingTableUpdateConfirmation
  - RoutingTableStatusRequest
  - RoutingTableStatus
- Milestones this year:
  - Draft of routing procedures
  - Draft of Authority procedures and service interfaces

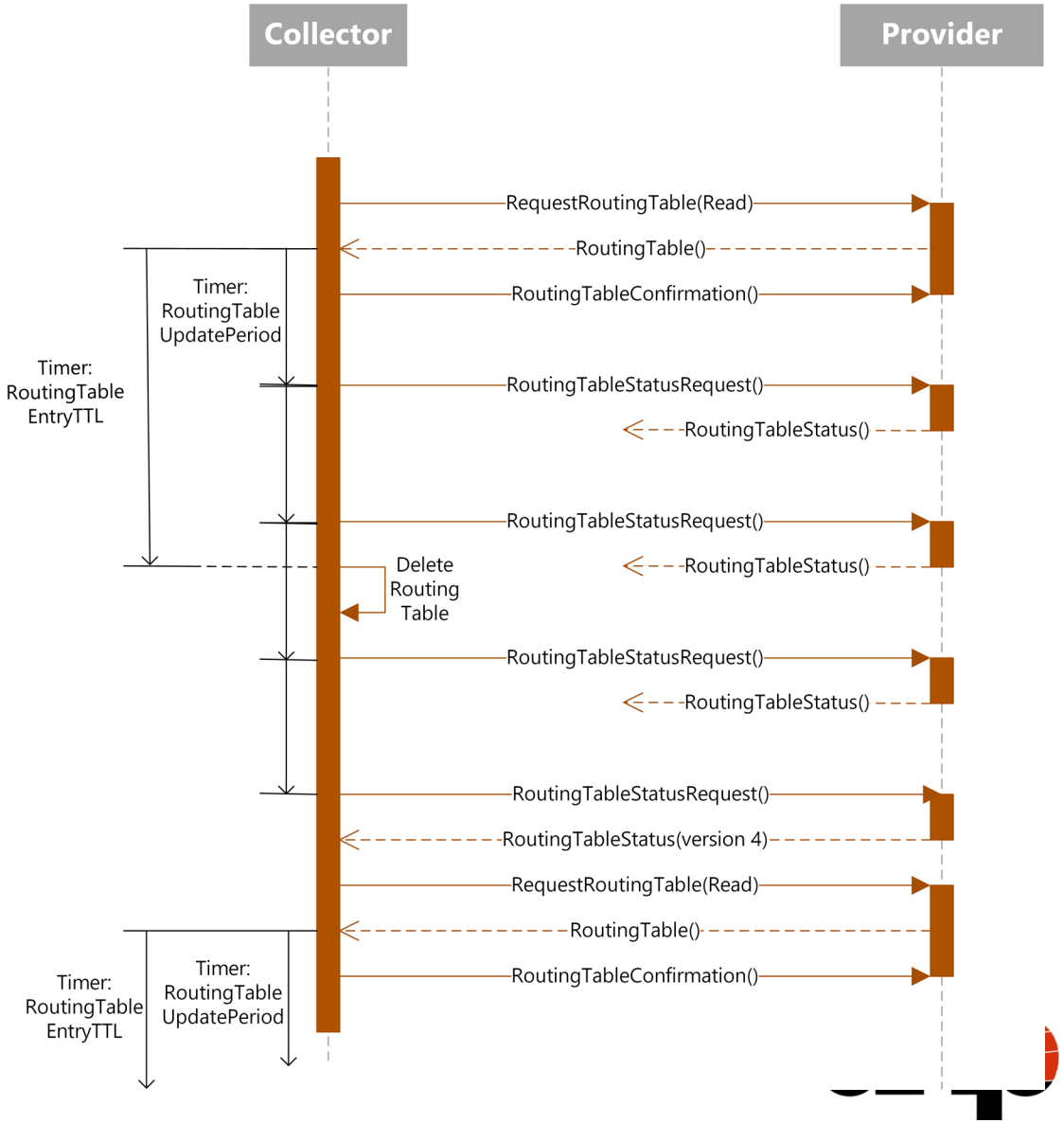
AMP Example

1. Outstation registers as “orphan”
2. Outstation configured
3. Association established
4. Routing table updated
5. New outstation verified
6. New outstation certificate
7. New association authorized
8. New master certificate



AMP Routing

- Devices only route AMP messages
- Devices route using Distinguished Names
- Routing table updates are report-by-exception, i.e. send changes only except when comms is lost
- Polled-only except to indicate a restart
- Two timers:
  - Routing Table Update Period
  - Routing Table Entry Time-to-Live (TTL)



Present Status

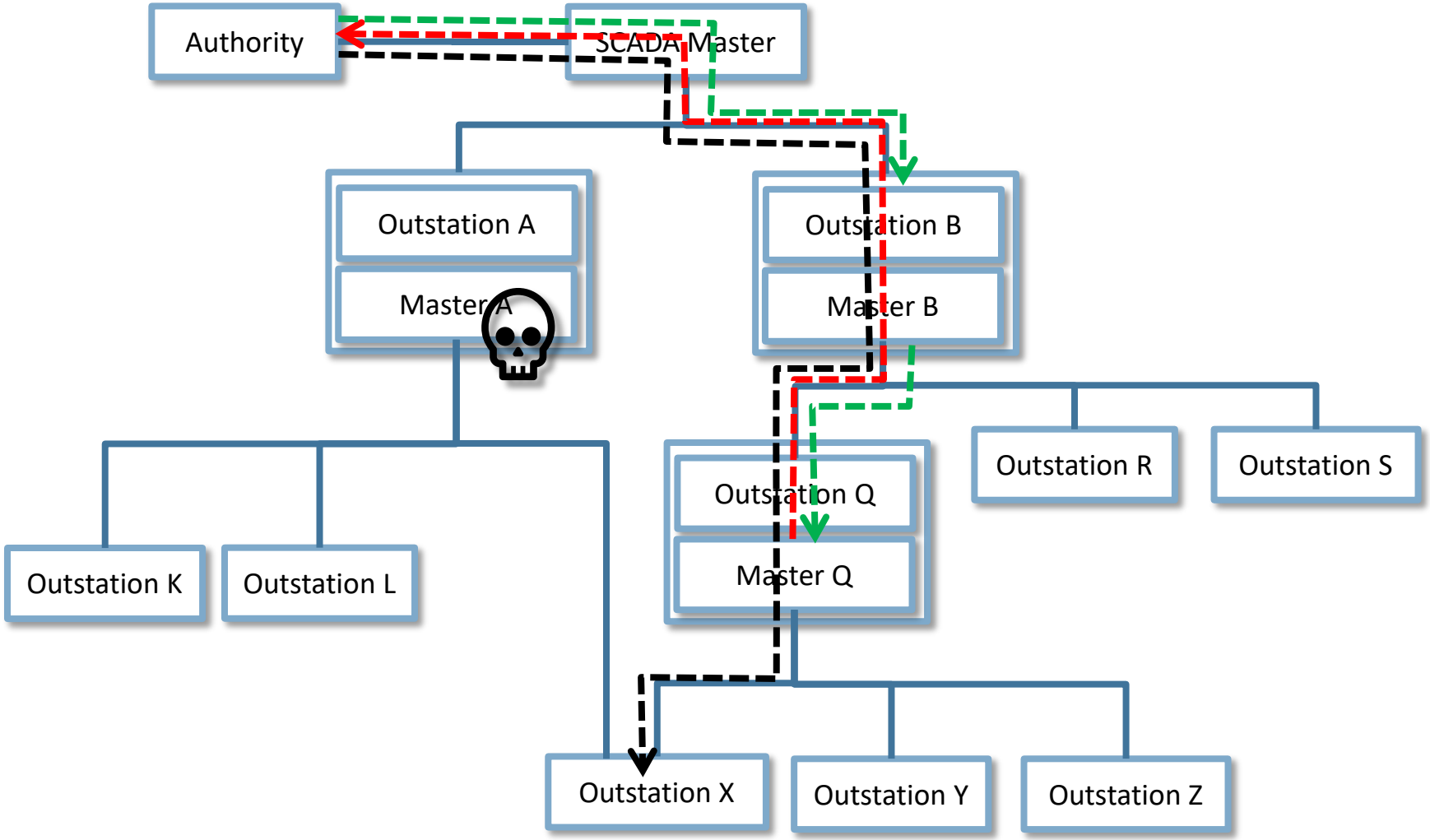
- First draft of DNP3-SAv6 is available online and being reviewed
  - Aligning with work on IEC 62351-5 by IEC TC57 working group 15
  - Review and revision by Cyber-Security Task Force also underway
  - Reference implementation is being developed in parallel
- AMP
  - Format of messages defined in ASN.1
  - Policies, configuration parameters and use cases identified
  - Capturing semantics of the protocols
- Target is for vendor demonstration in fall 2021
  - Aggressive schedule

Summary

- DNP3-SAv6 secure session protocol is published and under review by technical committee and vendors
- AMP is in progress, planned for publishing draft by end of 2020
- Targeting vendor interoperability testing in fall 2021.
- Users Group recommends continuing to use DNP3-SAv5 for near-term projects

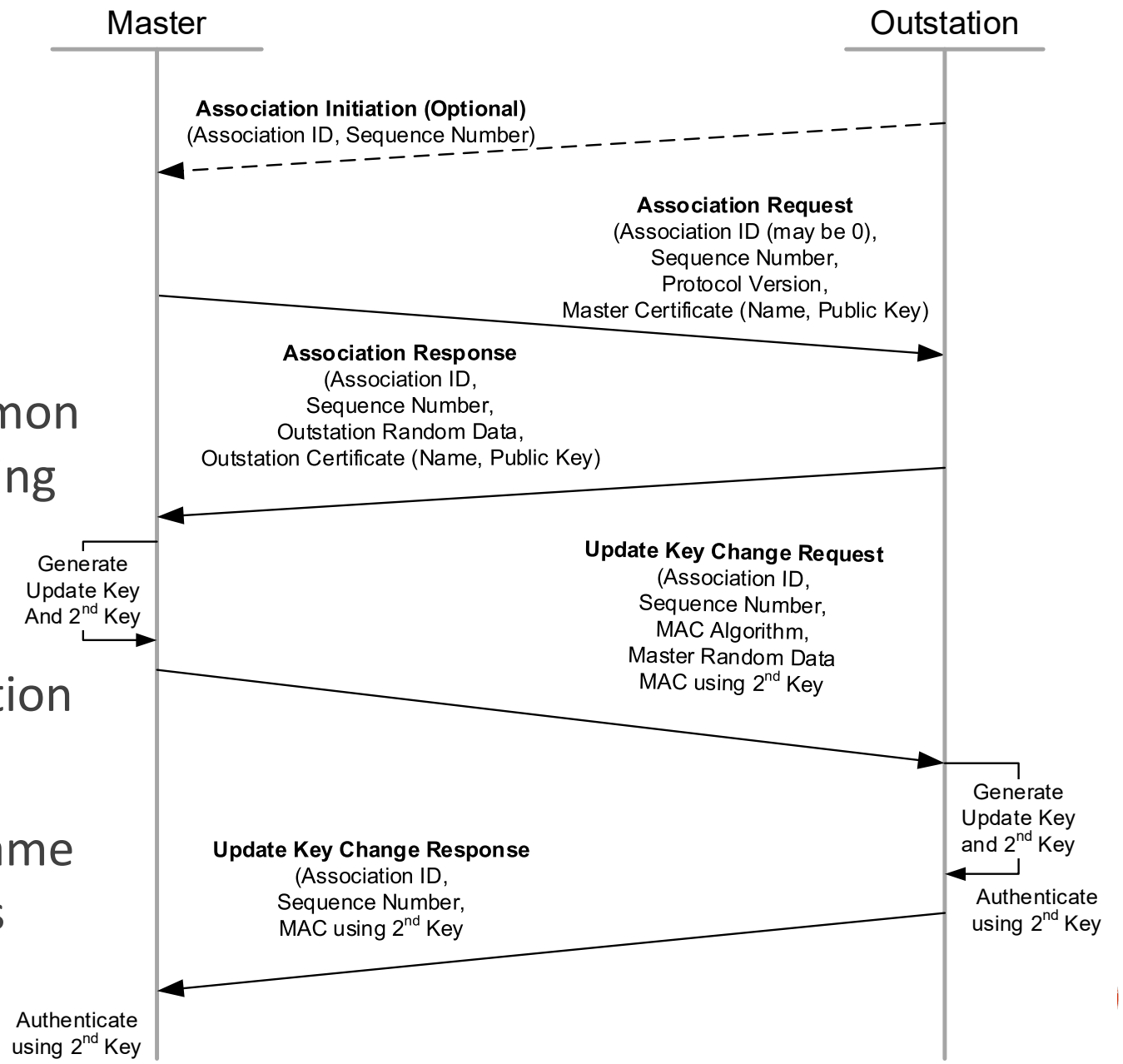
Reference Slides

AMP Routing


Authority
SCADA Master
Outstation A
Master A
Outstation B
Master B
Outstation K
Outstation L
Outstation Q
Master Q
Outstation R
Outstation S
Outstation X
Outstation Y
Outstation Z

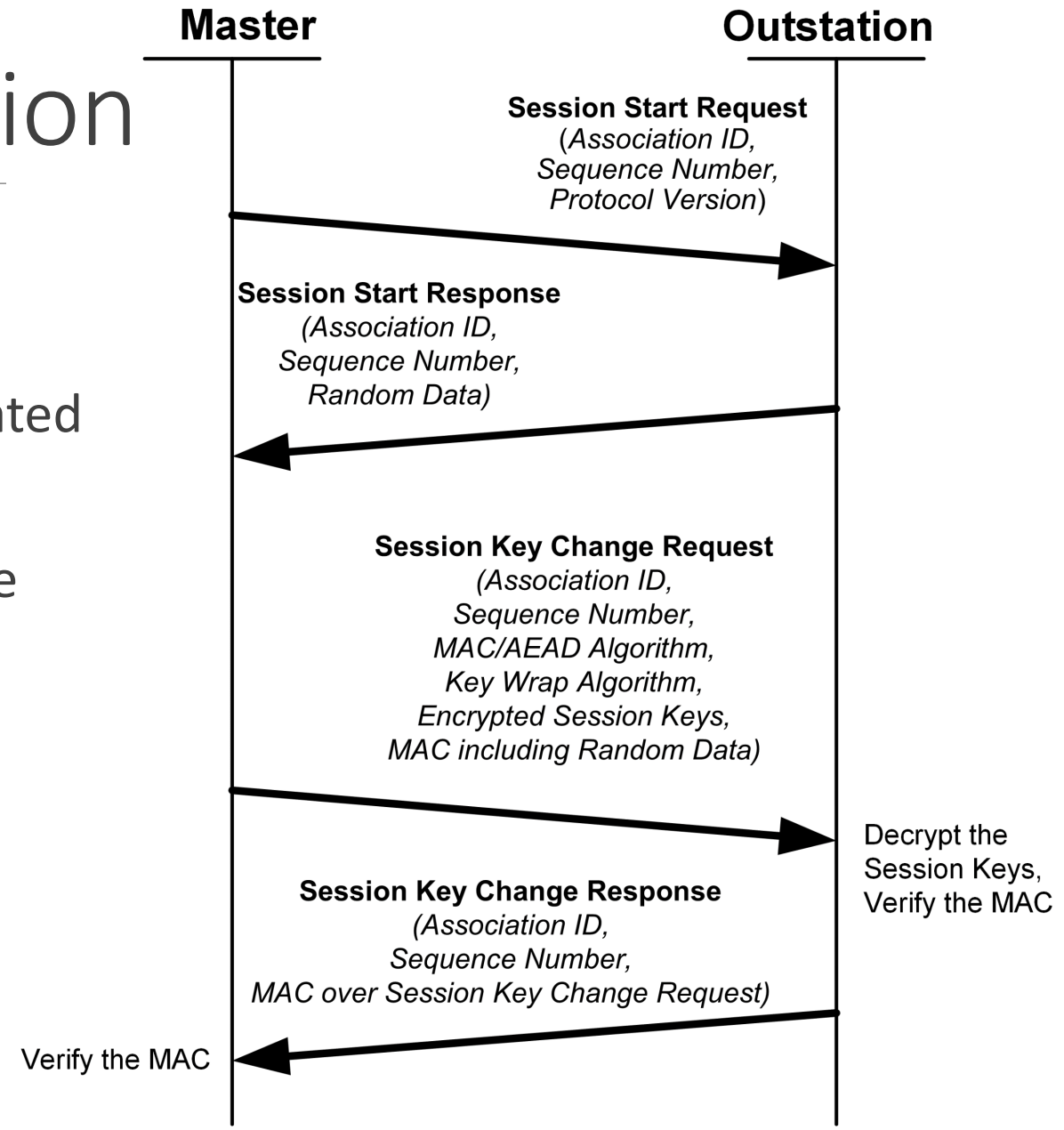
Association Establishment

- Master and Outstation exchange random data and certificates
- Both independently generate a common symmetric “Update Key” for encrypting DNP3-SAv6 Session Keys
- Uses Elliptic Curve Diffie-Hellman (ECDH) and HMAC-based Key Derivation (HKDF) algorithms
- MACs are generated as part of the same process that creates the Update Keys



Session Key Initialization

- Symmetric Session Keys changed periodically to avoid brute-force attack
- Encrypted using the Update Key generated during the association establishment
- Random Data and MACs over the whole process ensure it is authenticated
- MACs use the 2nd key generated in the association establishment phase
- Therefore two Update Keys:
  - Encryption Update Key
  - Authentication Update Key



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- Test Management Committee
- Wrap up
- Q&A

Chat room is being facilitated

Test Procedure Sub-Committee (TPSC)

ANDREW WEST, CHAIR, DNP TECHNICAL COMMITTEE
REGIONAL TECHNICAL DIRECTOR, SUBNET SOLUTIONS

DNP TPSC Activity Summary (November 2020)

- Publications
  - Part 2 of Master Station Test Procedures

- Work in Progress
  - Part 3 of Master Conformance Test Procedures
  - Outstation Conformance Test Procedures
    - Integration of outstation IP (LAN/WAN) test procedures

Work in Progress: TPSC

- Master Station Test Procedures (MSTP)
  - A three-part test definition program
    - Part 1 (published 2018)
      - Specifies a format for a Protocol Implementation Conformance Statement (PICS)
      - Allows a master vendor to specify a selection of DNP3 capabilities for requests and responses
      - Only the specific functions (identified in this part) that are implemented by the master are to be tested
    - Part 2 (published 2020)
      - Specifies the high-level approach to testing the functions identified in the PICS (Part 1)
      - Includes protocol extra information for testing (PIXIT) provided by vendor
        - Typically answering “How does the master show that ….”

Work in Progress: TPSC

- Master Station Test Procedures (MSTP)
  - A three-part test definition program
    - Part 3 (in development)
      - Specifies the detailed test steps to implement the tests described in Part 2, using DP, PICS & PIXIT
  - TC commenced detailed review of at the TC annual meeting, November 2020
  - MSTP Review has triggered some specification updates / clarifications
- The MSTP Test process will be a smorgasbord
  - Only specific functions implemented by the master are to be tested
  - Avoids previous issues relating to defining required master functionality

Work in Progress: TPSC

- Master Station Test Procedures (MSTP)
  - Part 1: PICS
    - Color-coded entries
    - Footnotes

Problem With Levels

1

1, 2

1, 2, 3

General area			Master station requests		Always	Opt	Never
Data Link and General			Send messages with Data Link Confirm				
			Supports DNP3 serial				
			Supports DNP3 LAN/WAN (UDP, TCP)	General			
				UDP listening			
				TCP dual end point			
Poll	All Data	Class Data	Only class 0		2		
			Classes 1, 2, 3, and 0				
			Class 1, 2, and/or 3				2
	Binary	Static data	Variation 0	All qualifier (06)			
				Start/stop Qualifier (00,01)			
			Explicit variation				
		Event data	Variation 0				
			Explicit variation		3		
			Processes time stamps in messages				
	Counter	Static data	Variation 0	All qualifier (06)			
				Start/stop qualifier (00,01)			
			Explicit variation				
		Event data	Variation 0		4		
			Explicit variation 1 or 2		4		
	Frozen	Static data	Variation 0				
			Explicit variation without time				
			Explicit variation with time				

Work in Progress: TPSC

- Master Station Test Procedures (MSTP)
  - Part 2: Test Plan
  - PIXIT
    - Explains how to observe operation of the master
    - Provides additional information to support testing, such as how to configure outstation to demonstrate functions

Table A – PIXIT		
Item or Area		To be completed by master station vendor
General	Specific	
Outstation Type Support	Level 1	Can the master communicate to an outstation that supports all functionality, and only that functionality, defined by DNP3 subset level 1
	Level 2	Can the master communicate to an outstation that supports all functionality, and only that functionality, defined by DNP3 subset level 2
	Level 3	Can the master communicate to an outstation that supports all functionality, and only that functionality, defined by DNP3 subset level 3
	Single Frame	Can the master support a “single frame” outstation, one that reports all static values in a single frame class-0 response and never generates events? If so, describe the process used for obtaining data from these outstations.
Testing Database, see section 2.1.2	Level 1	Define the database configuration of the level 1 outstation for testing
	Single Frame	Database configuration of the single-frame level 1 outstation for testing
	Level 2	Define the database configuration of the level 2 outstation for testing

Work in Progress: TPSC

- Master Station Test Procedures (MSTP)
  - Part 3: Test Procedures
    - Defines the steps to perform the tests
    - Defines information to be included in the test report
    - For each test:
      - Setup: DP / PIXIT / PICS references; Outstation types to test; Master & Outstation configuration
      - Test procedures & Observations: Steps to perform, data and observations to be recorded
      - Test report: Specific Information for each test to be included in test report
    - Tests specify required outstation responses for each test
      - Functionality from multiple Subset Levels is verified
      - Some “error responses” are required: A simulator will almost certainly be needed

Work in Progress: TPSC

- MSTP Part 3
  - TC Review will continue during usual MSTP meeting timeslots
    - Alternate week between regular TC meetings
    - All TC members (and interested UG members) invited to participate
- IED LAN Test Procedures
  - Addresses specific requirements for LAN/WAN enabled devices
    - Draft complete, may require revision based on IP specification updates
  - Will be merged into the Outstation Conformance Test Procedures

Work in Progress: TPSC

- Outstation Conformance Tests, Revision 3
  - Merges previous Subset Level 1 and Subset Level 2 documents into one
  - Adds tests for Subset Level 3
    - Also tests functionality “beyond” Levels 1 and 2 that are part of Level 3
  - Draft review performed at the TC “COVIDEO” annual meeting, Nov 2020
    - Minor rework required before release
  - Expected completion by the end of 2020
  - Will require a DNP-UG membership vote for adoption
    - Some changes or new tests could fail a device that passed earlier versions of the tests

Webinar is being recorded

Outline – Part 1 – Core Program

- Introductions
- COO and Director Update
- Technical Committee
- Cyber Security Task Force
- Test Procedure Subcommittee
- **Test Management Committee – Ronald Landheer-Cieslak**
- Wrap up
- Q&A

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DNP TMC status update

DNP-UG UPDATE WEBINAR – NOVEMBER 2020

Quick reminder of the purpose

- Purpose is to develop and maintain an efficient ***test and certification*** process that:
  - promotes interoperability
  - verifies conformant master and outstation implementations of DNP3
- Does not maintain the conformance test procedures
  - These are maintained by the DNP Test Procedures Sub-Committee (TPSC)

Organization

- One paid staff, coordinator
  - Coordinates with vendors, reviewers
  - Reports to Test Management Committee
- Test Management Committee
  - Nine members
  - Meets once every three weeks
  - Provides oversight for review process
  - Develops process, policies
  - Monthly reports to Directors
  - Annual report to Users Group

Activities for 2020

- Certifying all previously-approved devices — ***done***
- Policy for devices with multiple interface types — ***done***
- Policy for handing certificates on the website — *on hold (website)*
- Policy for handling test procedure versions — ***done***
- Policy for managing the CTR access fee — ***in progress*** *(being voted)*
- CTR reviewers' guide — ***in progress*** *(close to final)*
- Recommended practice — ***in progress***
- Continuous improvement:
  - Finding more reviewers
  - Better integration with test houses
- Device Profile Guide — ***in progress with the Technical Committee***

“Hot topics”

- Integration with independent testers
  - Being discussed at the moment
  - Goal is to allow vendors to have their devices tested and certified in a single process
- Tester accreditation
  - Exploratory discussions are under way
  - Goal is for independent testers to be able to certify devices without requiring additional review
- Coordinating with other industry groups to provide testing and certification for DNP3 profiles
  - Currently working on a certification program for the DER profile (AN2018-001)
- Adding more reviewers

How you can help

- Support the program financially
- Join the DNP TMC
- If you're a DNP expert: become a reviewer!

Webinar is being recorded

Outline – Part 1 – Core Program

- Introductions
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- Test Management Committee – Ronald Landheer-Cieslak
- **Wrap up**
- **Q&A**

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Outline – Part 2 – Member Engagement

- Q&A on our current programs
- Input on future developments
- Suggestions for UG offerings and services
  - E.g. Priority webinar topics
- Other feedback

Chat room is being facilitated

Suggestions for UG Offerings and Services

- James Formea – when Tech Bulletins are released, consider providing a short webinar to explain what the change is, the need for it, all that a casual reader would need to know, and as much information as possible to aid implementation.
- Great suggestion!

Thanks for Attending!

DNP-UG UPDATE WEBINAR - NOVEMBER 12, 2020

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