A315a: Understanding User Needs for Actuated Traffic Signal (ASC) Controllers Based on NTCIP 1202 Standard v03

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Module Description

This module is a part of the acquisition curriculum path with I101, A101, A102, and A201 being the prerequisites. This module is the first step leading to the user being able to write specifications with a focus on Actuated Traffic Signal Controller (ASC) user needs. The next logical step is A315b: Understanding Requirements for Actuated Traffic Signal Controllers Based on NTCIP 1202 Standard, which focuses on ASC requirements. The logical next step for the participant is to consider modules in the testing lifecycle, which are T101, T201, and T202; and T203 Parts 1 and 2, and T204, which lead up to the T315 module: Applying your Test Plan to the NTCIP 1202 ASC Standard v03.

1. Introduction/Purpose

This module provides participants with information on how to identify their user needs for an Actuated Traffic Signal Controller (ASC). NTCIP 1202 v03, Object Definitions for Actuated Signal Controllers, was recently updated and published. This standard defines object (s)? to allow transportation professionals to monitor, configure and control traffic signal controllers. Version 3 of the standard was developed using a Systems Engineering Process (SEP) and contains user needs, requirements and design content. The SEP allows transportation managers and specification writers to more easily prepare a Procurement Requirements List (PRL) for ASC procurement specifications.

The purpose of this updated module is to incorporate necessary changes made by the updated NTCIP standard v03 (from v02) and assist technical staff in writing unambiguous, complete, and well-written user needs based on NTCIP 1202 v03. This module provides participants with information on how to identify the appropriate use of the NTCIP 1202 v03 and acquire a traffic signal control system based on what the user is seeking to accomplish. This module also provides participants with information on how to identify user needs that can be traced to requirements, which will be discussed in A315b: Understanding Requirements for Actuated Traffic Signal Controllers Based on NTCIP 1202 Standard. This module helps the participant understand the interdependency of NTCIP 1202 objects to the architecture and functionality of NEMA TS2.

This module will provide participants with information to understand the scope of the NTCIP 1202 v03 Standard, identify the appropriate use of the Standard to acquire an Actuated Traffic Signal Controller or ASC system, and how to prepare (tailor) their ASC project specification based on the information provided by the Standard. Based on what the user is seeking to accomplish, the module will demonstrate how to use tools and resources in the Standard such as the PRL and the Systems Engineering Process .

2. History of the Standard

- NTCIP 1202 v01: Approved in 1996
- NTCIP 1202 Amendment 1: Drafted in 1999; rolled into version 2

- NTCIP 1202 v02: Approved 2005
- NTCIP 1202 v03: Published May 2019

3. Reference to Other Standards

Actuated Traffic Signal Controllers

- **NEMA Standards Publication TS 1-1989: Traffic Control Systems, R 1994, R2000, R2005,** NEMA, October 1, 2004. https://www.nema.org/Standards/Pages/Traffic-Control-Systems.aspx

- **NEMA Standards Publication TS 2-2016: Traffic Controller Assemblies with NTCIP Requirements,** NEMA, version 3.07, July 19, 2016. https://www.nema.org/Standards/Pages/Traffic-Controller-Assemblies-with-NTCIP-Requirements-Version-03-07.aspx

- **ATC 5202 Standard v3.04: Model 2070 Controller Standard Version 03**, A Joint Standard of AASHTO, ITE, and NEMA, December 28, 2012. http://library.ite.org/pub/e269b8d3-2354-d714-51bb-023fbd90ddad

- **ATC 5201 v06.25, Advanced Transportation Controller (ATC) Standard Version 06,** A Joint Standard of AASHTO, ITE, and NEMA, January 12, 2018. http://library.ite.org/pub/acaf6aca-d1fd-f0ec-86ca-79ad05a7cab6

- **ATC 5301 v02.02, Advanced Transportation Controller (ATC) Cabinet Standard Version 02,** A Joint Standard of AASHTO, ITE, and NEMA, March 18, 2019. https://www.ite.org/pub/461BB8F9-F29A-E085-D891-F9DD14A0AE82

NTCIP

- **NTCIP 1202 v03A, National Transportation Communications for ITS Protocol: Object Definitions for Actuated Traffic Signal Controller (ASC) Units – version 03A**, AASHTO/ITE/NEMA, v03.28, May 2019. https://www.ntcip.org/

- **NTCIP 9001 Version v04, National Transportation Communications for ITS Protocol, The NTCIP Guide,** AASHTO/ITE/NEMA, July 2009. https://www.ntcip.org/

- **NTCIP Joint Committee: NTCIP 1201 Version v03.15r, National Transportation Communications for ITS Protocol, Global Object Definitions,** AASHTO/ITE/NEMA, March 2011. https://www.ntcip.org/

Systems Engineering

- **IEEE Std 1362-1998, IEEE Guide for Information Technology - System Definition - Concept of Operations (ConOps) Document**, IEEE, 1998.

4. Glossary

Term	Definition
ADA	Americans with Disability Act
ASC	Actuated Traffic Signal Controller
Agency Specification	A document that has been prepared by an agency to define requirements for a subject item or process when procured by the agency.
Agent	The entity that receives commands and transmits responses to the received commands.
Compliance	A condition that exists when an item meets all of the requirements of an agency specification.
Concept of Operations	A document that describes the purpose for a system project, including a description of the current and proposed system, as well as key user needs that the new system is required to address.
Conformance	A condition that exists when an item meets all of the mandatory requirements as defined by a standard. It can be measured on the standard as a whole, which means that it meets all mandatory (and applicable conditional) requirements of the standard or on a feature level (i.e., it conforms to feature X as defined in section X.X.X), which means that it meets all mandatory (and applicable conditional) requirements of the feature.
Dialogs	A sequence of information or message exchanges.
Interoperability	The ability of two or more systems or components to exchange information and use the information that has been exchanged. Note: From IEEE Standards Dictionary, Glossary of Terms and Definitions.
Manager	The entity that sends commands to entities and processes their responses.
MAP message	The MAP Data message is used to convey many types of geographic road information. At the current time, its primary use is to convey one or more intersection lane geometry maps within a single message. Note: From SAE J2735_201603
MIB	Management Information Base. A structured collection or database of related managed objects defined using Abstract Syntax Notation One (ASN.1). Note: From NTCIP 8004 v02 and ISO/IEC 8824-1:2008 and ISO/IEC 8825-1:2008.
Object Identifier	A unique name (identifier) that is associated with each type of object in a MIB that is a defined ASN.1 type.

Term	Definition
Roadside Unit (RSU)	DSRC devices that serve as the demarcation component between vehicles and other mobile devices and existing traffic equipment. Note: From DSRC Roadside Unit Specification Document v4.1
SPaT message	The Signal Phase and Timing (SPAT) message is used to convey the current status of one or more signalized intersections. Along with the MSG MapData message (which describes a full geometric layout of an intersection) the receiver of this message can determine the state of the signal phasing and when the next expected phase will occur. Note: From SAE J2735_201603

5. Actuated Signal Controller Characteristics

Cabinet Specifications

Some user needs defined within NTCIP 1202 v03 apply only to ASCs using a specific transportation cabinet architecture. There are five transportation cabinet architectures that are commonly used in North America.

a) **Model 332 Cabinet.** A cabinet specification defined in the Caltrans Transportation Electrical Equipment Specification TEES.

b) **NEMA TS 1 Cabinet.** A cabinet architecture defined in NEMA TS 1-1989 (R2005).

c) **NEMA TS 2 Type 2 Cabinet.** A cabinet architecture defined in the NEMA TS 2-2016 v03.07, Traffic Controller Assemblies with NTCIP Requirements standard.

d) **NEMA TS 2 Type 1 Cabinet.** A cabinet architecture defined in the NEMA TS 2-2016 v03.07, Traffic Controller Assemblies with NTCIP Requirements standard.

e) **ITS Cabinet.** A specification for Intelligent Transportation Systems (ITS) enclosures. The ITS Cabinet specification defines the subassemblies that provide functionalities within the cabinet.

6. References

Systems Engineering

- *Systems Engineering Guidebook for Intelligent Transportation Systems Version 3.0,* United States Department of Transportation, November 2009.

- "**Building Quality Intelligent Transportation Systems Through Systems Engineering Prepared for Intelligent Transportation Systems,**" Joint Program Office U.S. Department of

Transportation by Mitretek Systems, Inc., FHWA-OP-02-046, April 2002. Available online at: http://ntl.bts.gov/lib/jpodocs/repts_te/13620.html Accessed March 23, 2011.

7. Study Questions

Question 1: Which of the below is not a true statement about NTCIP 1202 v03?

a) Part of the NTCIP Family of Standards
b) Contains systems engineering content
c) Describes the hardware functionality of a traffic controller
d) Contains user needs to manage a traffic controller

Question 2:   Which of the following is a benefit of extensions?

a) Addresses a user need that is not supported by the standard
b) Addresses interoperability
c) Changes the cost for testing and maintenance
d) Requires additions to the agency specification

Question 3: Which of the following is a benefit of the PRL table?

a) Map needs to requirements
b) Provides a list of features supported the standard
c) Provides a convenient checklist during deployment
d) All of the above

Question 4:   Which of the following is a FALSE statement related to an ASC specification?

a) The ASC specification includes a PRL
b) Conformance requires satisfying all mandatory user needs
c) Vendor must use the project PRL
d) Compliance requires only satisfying mandatory user needs