A313a
Understanding User Needs For ESS Systems Based on NTCIP 1204 v03 Standard

STANDARDS ITS TRAINING

STUDENT SUPPLEMENT

RITA Intelligent Transportation Systems Joint Program Office

A313a: Understanding User Needs for ESS Systems Based on NTCIP 1204 v03 Standard

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Purpose

Module A313a will provide participants with information on how to identify the appropriate use of the NTCIP 1204 standard and acquire an ESS system based on what the user is seeking to accomplish with support from tools and resources such as a Protocol Requirements List (PRL) in following a systems engineering (SE) process.

This module helps the user understand the scope of the ESS standard and its versions. It also assists in identifying the uses and associated needs of ESS systems. This module is to be placed in the context of the SE process as well as in the acquisition curriculum path with I101, A101, A102, and A201 being the prerequisites and A313b-Specifying Requirements for ESS Systems Based on NTCIP 1204 v03 Standard following this module.

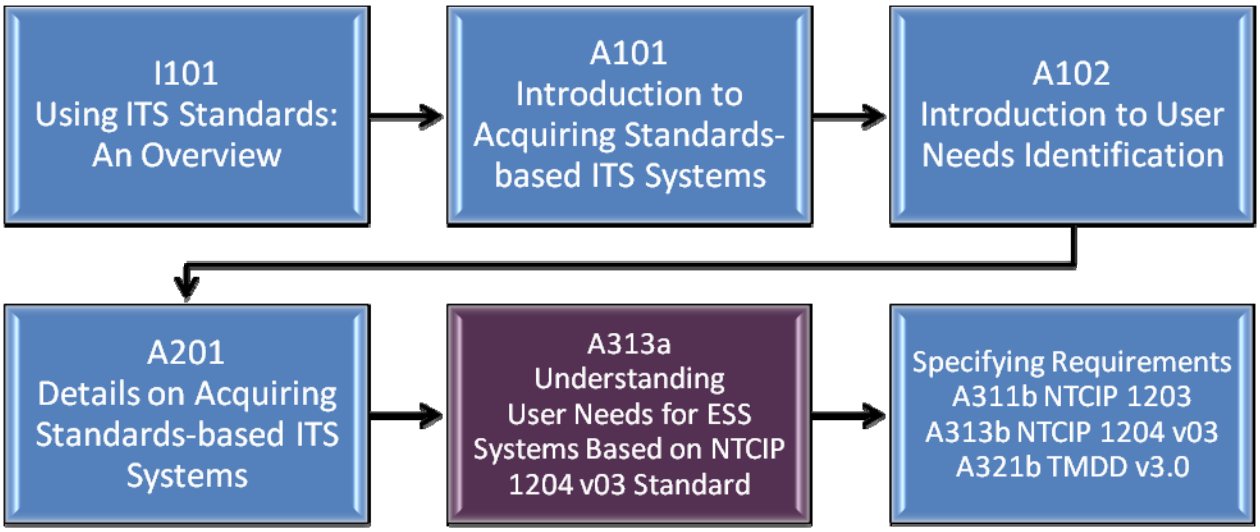
This participant supplement provides:

- A history of the NTCIP 1204 standard
- A chart showing the prerequisites and follow up PCB modules
- A summary of the user needs supported by NTCIP 1204 v03 and its conformance statement
- A glossary of terms used in this module
- A list of reference materials for further reading or study

NTCIP 1204 History

- NTCIP v01 was published in 1998
- NTCIP 1204 Amendment 1 was approved in 2001
  - Responded to questions from actual implementations
- NTCIP 1204 v02 development between 2001 and 2006
  - Added Concept of Operations, Functional Requirements, Dialogs, updated Object Definitions, PRL, and Requirements Traceability Matrix (RTM)
- NTCIP 1204 v02 accepted in 2007
- NTCIP 1204 v03
  - Adds test procedures
  - Updates systems engineering process (SEP)
- NTCIP 1204 v03 accepted in 2009

Curriculum Path – Showing Pre-Requisites to A313a and A313b (Requirements)



Protocol Requirements List (PRL) – NTCIP 1204 v03 (User Needs Only)

User Need ID	User Need	FR ID	Functional Requirement	Conformance	Project Requirement	Additional Project Requirements
2.4	Architectural Needs			M	Yes	
2.4.1	Generic Architectural Needs			M	Yes	(See F.1.1)
2.5	Features			M	Yes	
2.5.1	ESS Manager Features			M	Yes	
2.5.1.1	Generic Features			M	Yes	(See F.1.2)
2.5.1.2	Monitor Door Status			O	Yes/No	
2.5.1.3	Monitor Power			O	Yes/No	
2.5.1.4	Monitor Mobile Station Data			Mobile:M	Yes/NA	
2.5.2	Sensor Manager Features			O.1 (1..*)	Yes/No	
2.5.2.1 (Weather)	Monitor Weather Conditions			O.2 (1..*)	Yes/No/NA	
2.5.2.1.1 (Pressure)	Monitor Atmospheric Pressure			O.3 (1..*)	Yes/No/NA	
2.5.2.1.2 (Wind)	Monitor Winds			O.3 (1..*)	Yes/No/NA	
2.5.2.1.3 (Temperature)	Monitor Temperature			O.3 (1..*)	Yes/No/NA	
2.5.2.1.4	Monitor Humidity			O.3 (1..*)	Yes/No/NA	
2.5.2.1.5	Monitor Precipitation			O.3 (1..*)	Yes/No/NA	
2.5.2.1.6	Monitor Solar Radiation			O.3 (1..*)	Yes/No/NA	
2.5.2.1.7	Monitor Visibility			O.3 (1..*)	Yes/No/NA	
2.5.2.1.8	View Weather Image			O	Yes/No/NA	
2.5.2.2 (Pavement)	Monitor Pavement			O.2 (1..*)	Yes/No/NA	
2.5.2.2.1	Monitor Pavement Surface Condition			M	Yes/NA	
2.5.2.2.2 (Icing)	Monitor Icing Conditions			O	Yes/No/NA	
2.5.2.2.3	View Pavement Image			O	Yes/No/NA	
2.5.2.3 (Subsurface)	Monitor Subsurface Conditions			O.2 (1..*)	Yes/No/NA	
2.5.2.4	Monitor Human Readings			O.2 (1..*)	Yes/No/NA	
2.5.2.5	Monitor Water Level			O.2 (1..*)	Yes/No/NA	
2.5.2.6 (Air)	Monitor Air Quality and Biohazards			O.2 (1..*)	Yes/No/NA	
2.5.2.7	Monitor Mobile Weather Profile			O	Yes/No/NA	
2.5.3	Pavement Treatment System Manager Features			O.1 (1..*)	Yes/No/NA	
2.5.3.1	Manage Stationary Spray System			Mobile:X; M	Yes/No/NA	
2.5.3.2	Manage Mobile Spray System			Mobile:M	Yes/No/NA	

User Need ID	User Need	FR ID	Functional Requirement	Conformance	Project Requirement	Additional Project Requirements
2.6	Backwards Compatibility Needs			O	Yes/No	
2.6.1	Backwards Compatibility with Version 1			O	Yes/No/NA	
2.6.2	Backwards Compatibility with Version 2			O	Yes/No	
F.1.1	Generic Architectural Needs			M	Yes	
F.1.1.1 (ESS)	Provide Live Data			M	Yes	
F.1.1.2 (Compressed)	Provide Compressed Data			Mobile:M; O	Yes/No	
F.1.1.3	Provide Off-line Log Data			Mobile:M; O	Yes/No	
F.1.2	Generic Features			M	Yes	
F.1.2.1	Retrieve the Device Identity			M	Yes	
F.1.2.2	Control External Devices			O	Yes/No	

Glossary

Term	Definition
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.
Binary Universal Form for the Representation of Meteorological Data (BUFR)	A definition for a binary data format maintained by the World Meteorological Organization (WMO). BUFR was designed to be portable, compact, and universal. Any kind of data can be represented, along with its specific spatial/temporal context and any other associated metadata. In the WMO terminology, BUFR belongs to the category of *table-driven code forms*, where the meaning of data elements is determined by referring to a set of tables that are kept and maintained separately from the message itself.
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.
Download	*To download* means to receive data to a local system from a remote system, or to initiate such a data transfer. Examples of a remote system from which a download might be performed include a webserver, FTP server, email server, or other similar systems. A *download* can mean either any file that is offered for downloading or that has been downloaded, or the process of receiving such a file.
Environmental Sensor Systems (ESS) – same as RWIS	A location that includes a remote processor unit (RPU) connected to one or more sensors for the collection of environmental or meteorological data. It may also include a pavement treatment system (PTS). NOTE—The acronym ESS may also be used in the plural.

Informative	Information that identifies a document, introduces its content and explains its background, development, and relationship with other documents; or information that provides additional information intended to assist the understanding or use of the document (see normative).
Interchangeability	A condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or adjoining items, except for adjustment, and without selection for fit and performance.
Interoperability	The ability of two or more systems or components to exchange information and use the information that has been exchanged.
Normative	Information that describes the scope of the document, and which sets out provisions (ISO). Normative elements are considered to be a prescriptive part of the standard (see informative).
Protocol Requirements List (PRL)	A table mapping user needs with its associated requirements. This table allows procurement personnel to specify the desired features of an ESS or it could be used by a manufacturer to document the features supported by their implementation.
Requirement	A condition or capability needed by a user to solve a problem or achieve an objective.
Remote Processor Unit (RPU)	A field processor that collects data from sensors and can communicate the collected data to other computers; the processor may also process the collected data and/or control equipment.
Requirements Traceability Matrix (RTM)	A table that links the requirements to the corresponding dialogs and objects.
Road/Weather Information System (RWIS) – same as ESS	The collection of RPUs and sensors connected to a central system for analysis and use by maintenance personnel and transportation system managers.
Sensor	A device that is capable of detecting a condition and reporting the result to an RPU.
Specification	A document that references a standard either to define the capabilities of a component (e.g., a specification sheet) or to define the required capabilities of a component being procured (e.g., a procurement specification).

Systems Engineering	An interdisciplinary approach and means to enable the realization of successful systems. (INCOSE) An interdisciplinary, collaborative approach to derive, evolve, and verify a life-cycle balanced system solution, which satisfies customer expectations and meets public acceptability. (IEEE)
Upload	To transfer information from the referenced device to the central computer or an attached portable computer.
User Needs	The business or operational problem (opportunity) that is to be fulfilled to justify procurement or use. NOTE—While this is termed a "user need" within the NTCIP community, it reflects needs of all stakeholders.

References

Environmental Sensor Systems

- **NTCIP 1204 Version v03.08r2, National Transportation Communications for ITS Protocol, Object Definitions for Environmental Sensor Stations (ESS)**, AASHTO/ITE/NEMA, v03.08r2, October 2009.
- **NTCIP 9001 Version v04, National Transportation Communications for ITS Protocol, the NTCIP Guide**, AASHTO/ITE/NEMA, July 2009.

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