



# A322b: Understanding Requirements for Transportation Field Cabinet Systems Using ATC 5301 v02

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## 1. Module Description

This module is the second in a set of modules on the ATC 5301 ATC Cabinet Standard v02. It has the following recommended prerequisites in the ATC curriculum for students taking this course:

- A207a: Building an ITS Infrastructure Based on the ATC 5201 Standard Part 1 of 2
- A207b: Building an ITS Infrastructure Based on the ATC 5201 Standard Part 2 of 2
- A208: Using the ATC 5401 Application Programming Interface Standard to Leverage ITS Infrastructures
- A307a: Understanding User Needs for Advanced Transportation Controllers Based on ATC 5201 Standard v06
- A307b: Understanding Requirements for Advanced Transportation Controllers Based on ATC 5201 Standard v06
- A322a: Understanding User Needs for Transportation Field Cabinet Systems Using ATC 5301 v02

## 2. Introduction/Purpose

The Advanced Transportation Controller (ATC) family of standards provides an open architecture hardware and software platform that can support a wide variety of Intelligent Transportation Systems field applications including traffic management, safety, security, and other applications. These standards are characterized by their modularity, support of multiple and current application programs, and designed to facilitate the adoption of new technologies. There are three standards within the ATC program: the ATC 5201 ATC Standard, the ATC 5401 Application Programming Interface (API) Standard, and the ATC 5301 ATC Cabinet Standard.

The focus of this module is on the recently approved ATC 5301 ATC Cabinet Standard v02. This module builds on the previous module A322a. It describes the various assemblies and key components of an ATC Cabinet System. It helps students develop requirements based on user needs. The module shows how to combine the ConOps described in A322a with the requirements developed in A322b to create a specification for ATC Cabinets. It then demonstrates how to verify the specification.

At the conclusion of this module, students will be able to do the following:

1. Describe the features of ATC 5301 Standard v02 transportation field cabinet systems;
2. Write requirements for ATC Cabinet systems;
3. Create a procurement specification for ATC Cabinets; and
4. Verify the ATC Cabinet specification.

### 3. Samples/Examples

ADU	Auxiliary Display Unit
ATC	Advanced Transportation Controller
CMU	Cabinet Monitor Unit
CPS	Cabinet Power Supply
HDFU	High Density Flasher Unit
HDSP	High Density Switch Pack
SA	Service Assembly
SIU	Serial Interface Unit
SU	Sensor Unit

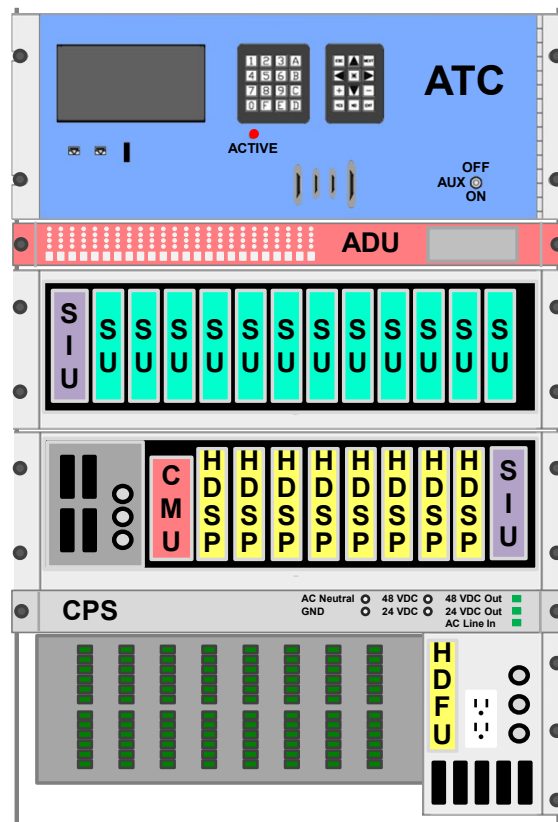


Figure 1. Generic Representation of an ATC Cabinet System

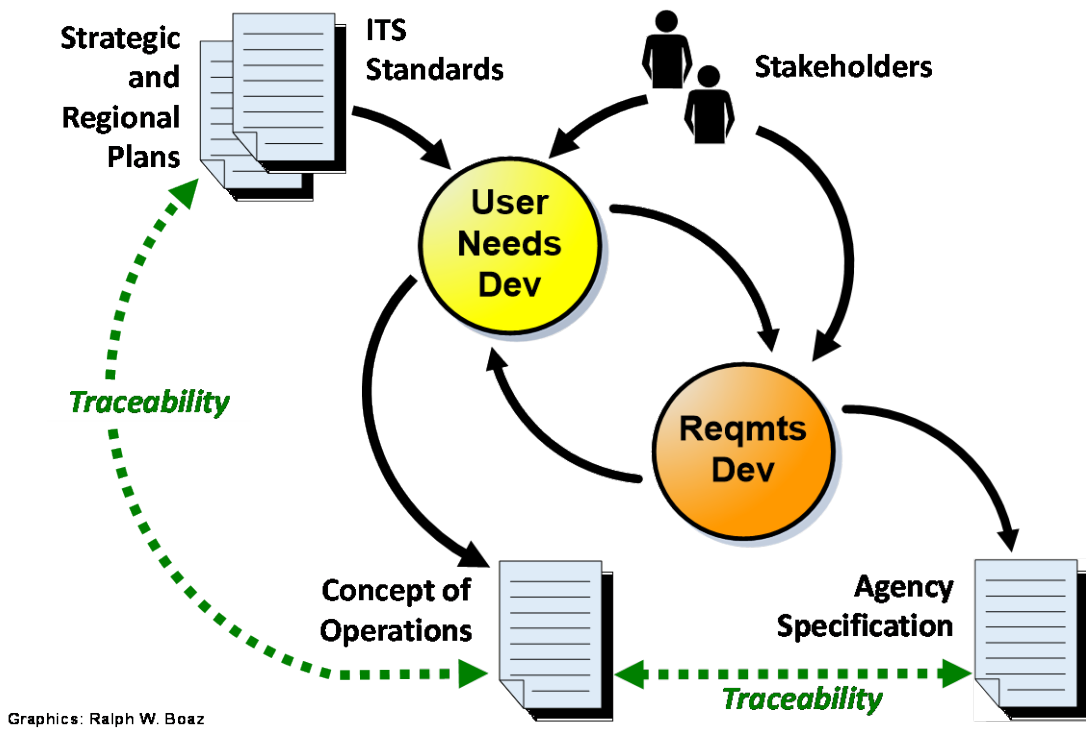


Figure 2. Systems Engineering Approach to Developing a Procurement Specification

#### 4. Reference to Other Standards

- Institute of Electrical and Electronics Engineers, IEEE 29148-2018 - ISO/IEC/IEEE International Standard - Systems and Software engineering -- Life cycle processes --Requirements Engineering. IEEE, 2018.  
<https://standards.ieee.org/standard/29148-2018.html>
- Institute of Transportation Engineers, “ATC 5201 Advanced Transportation Controller (ATC) Standard Version 06.25.” ATC Joint Committee, January 12, 2018.  
<https://www.ite.org/technical-resources/standards/atc-controller/>
- Institute of Transportation Engineers, “Recommended Standard ATC 5201 Advanced Transportation Controller (ATC) Standard Version 06A.” ATC Joint Committee, January 2020.  
<https://www.ite.org/technical-resources/standards/>
- Institute of Transportation Engineers, “ATC 5301 Advanced Transportation Controller (ATC) Cabinet Standard Version 02.” ATC Joint Committee, March 18, 2019.  
<https://www.ite.org/technical-resources/standards/its-cabinet/version-2/>
- Institute of Transportation Engineers, “ATC 5401 Application Programming Interface (API) Standard for the Advanced Transportation Controller (ATC) v02.17.” ATC Joint Committee, September 15, 2013. (Note same as September 1, 2011.)  
<https://www.ite.org/technical-resources/standards/atc-api/>
- Institute of Transportation Engineers, “Recommended Standard ATC 5401 Application Programming Interface (API) Standard for the Advanced Transportation Controller (ATC) v02A.” ATC Joint Committee, January 2020.  
<https://www.ite.org/technical-resources/standards/atc-api/>
- Institute of Transportation Engineers, “Intelligent Transportation System (ITS) Standard Specification for Roadside Cabinets v01.02.17b.” ATC Joint Committee, 16 November 2006.  
<https://www.ite.org/technical-resources/standards/its-cabinet/version-1-02-17b/>
- National Electrical Manufacturers Association, *NEMA Standards Publication TS 1-1989 Traffic Control Systems*. NEMA, 1989.
- National Electrical Manufacturers Association, *NEMA TS 2-2016 Traffic Controller Assemblies with NTCIP Requirements Version 03.07*. NEMA, 2016

#### 5. Glossary

To include additional **descriptions/acronyms** used primarily in the module. List out in alphabetical order.

Term	Definition
AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating current
ADU	Auxiliary Display Unit
ATC	Advanced Transportation Controller
ATCC	ATC Cabinet
CB	Circuit breaker
CBD	Central Business District
CMU	Conflict Monitor Unit
CPS	Cabinet Power Supply
ConOps	Concept of Operations
DC	Direct current
EMI	Electromagnetic interference
FHWA	Federal Highway Administration

<b>Term</b>	<b>Definition</b>
ESD	Electrostatic discharge
FTA	Field Termination Assembly
GFI	Ground fault interrupter
GFCI	Ground fault circuit interrupter
HDFU	High Density Flasher Unit
HDSP	High Density Switch Pack
HDSP/FU	High Density Switch Pack / Flasher Unit
IEEE	Institute of Electrical and Electronics Engineers
IA	Input Assembly
I/F	Interface
I/O	Input/output
IEC	International Electrotechnical Commission
IMSA	International Municipal Signal Association
IPC	Formerly, the Institute for Printed Circuits. This same institution was later called the Institute Interconnecting and Packaging Electronic Circuits. It is now referred to as IPC-Association Connecting Electronics Industries.
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
JPO	Joint Program Office
LED	Light emitting diode
MTBF	Mean time between failures
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NRTL	Nationally Recognized Testing Lab
NTCIP	National Transportation Communications for ITS Protocol
NFPA	National Fire Protection Association
OA	Output Assembly
PF	Power factor
RFI	Radio frequency interference
SA	Service Assembly
SDO	Standard Development Organization
SEMP	System Engineering Management Plan
SEP	Systems Engineering Process
SIU	Serial Interface Unit
SSC	Small-sized cabinet
StdRS	Standards Requirements Specification
StdHLD	Standards High Level Design
TFCS	Transportation field cabinet system
SU	Sensor Unit
UPS	Uninterruptible power source
USA	United States of America
USDOT	United States Department of Transportation
VAC	Voltage alternating current
VDC	Voltage direct current
WG	Working group

## 6. References

- California Department of Transportation, *Caltrans Transportation Electrical Equipment Specifications (TEES)*. California Department of Transportation, 12 March 2009.  
<http://www.dot.ca.gov/trafficops/tech/docs/TEES2009.pdf>
- Institute of Transportation Engineers, *ITS Cabinet V2 Standards Requirements Specification (StdRS) v01.04*. ATC Joint Committee, 31 January 2019.  
<https://www.ite.org/technical-resources/standards/its-cabinet/version-2/>

## 7. Study Questions

To include the quiz/poll questions and answer choices as presented in the PowerPoint slide to allow students to either follow along with the recording or refer to the quiz at a later date in the supplement.

1. Which of the following is a true statement?
  - a) ATC 5301 defines a controller as part of the cabinet system
  - b) ATC 5301 defines all mechanical specifications of each assembly
  - c) Serial Interface Units are optional in ATC Cabinets
  - d) Where there are defined options in ATC 5301, the agency specification should remove ambiguities
2. Which of the following would complete a well-formed requirement for our specification?  
The TFCS shall ...
  - a) Be weather resistant
  - b) Certify conformance to the NEMA TS 2 Standard v06
  - c) Utilize a Model 2220 Auxiliary Display Unit as defined by ATC 5301 v02
  - d) All of the above
3. Which of the following is a correct statement?
  - a) It's best to use Warranty Requirements found ATC 5301
  - b) Requirements are a major part of the ConOps
  - c) Almost any part of the procurement process may have requirements in a procurement specification

d) Most agencies create specifications with complete electrical, mechanical, and communications details

4. Which of the following is a true statement?

- a) The rationale of a user need should be examined for requirements
- b) Every user need must be addressed by at least two requirements
- c) It's best to wait until the end of requirements development to start a traceability matrix
- d) All of the above