
**Standard Development Report
for the
User Comment Draft ATC 5401 v02B.42
Application Programming Interface
for the
Advanced Transportation Controller
Standard**

September 16, 2021

The following Standard Development Report (SDR) is made in accordance with the Institute of Transportation Engineers (ITE) procedures for the Advanced Transportation Controller standards.

1 LATEST VERSION OF THE DRAFT PROPOSED STANDARD

Appendix I contains *User Comment Draft (UCD) ATC 5401 Application Programming Interface (API) Standard for the Advanced Transportation Controller (ATC) Version 02B.42 (UCD ATC 5401 v02B.42)*. It is an updated version to the current *Jointly Approved ATC 5401 v02A*. Jointly Approved means that the standard had been formally balloted and approved separately by the three cooperating standard development organizations (SDOs): the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA).

2 SUMMARY STATUS

As part of the ATC standards maintenance efforts, *UCD ATC 5401 v02B.42* is being distributed to the members of the cooperating standard development organizations (SDOs) for formal review. This action is based on the recommendation of the ATC Joint Committee (JC), the steering committee for the ATC program. Comments from potential users and other stakeholders of the standard are solicited. The standard contains the detailed design and requirements for software that runs on ATC transportation controller devices. Following this comment period, the comments received will be adjudicated by the ATC API Working Group (WG), *UCD ATC 5401 v02B.42* will be updated accordingly, and the standard will be moved through the Recommended and Approved stages of the standards development process to publication. Inquiries, comments or proposed changes to this standard should be submitted to:

ITS Standards Manager
Institute of Transportation Engineers
1627 I (eye) Street, NW, Suite 600
Washington, DC 20006
Voice: (202) 785-0060
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Email: standards@ite.org

Comments are requested using the fields described in Appendix II.

3 STATUS REPORT

The previous version of the standard, *ATC 5401 v02A*, was published as a Joint Standard of AASHTO, ITE and NEMA on July 29, 2020. *ATC 5401 v02A*, included changes to reflect the API Software developed as part of the API Reference Implementation (APIRI) project (see <https://www.ite.org/technical-resources/standards/api-reference-implementation/>).

UCD ATC 5401 v02B.42 represents a minor update to the previous version with substantive changes to message tables on Section 3.1.2 of the standard. The urgency for this update is to include support for the ATC Cabinet. Other major cabinet systems that are currently supported in API Software including 332, TS 1, TS 2, and ITS Cabinets. ATC Cabinets are: a) growing in numbers, b) safer for technicians and potentially the public, c) more space efficient, and d) generally higher value to end users. There have been other editorial changes throughout ATC 5401 including updates to the Sections 1 and 2 and diagrams.

The API WG submitted *ATC 5401 v02B.41* to the ATC JC for review as a proposed User Comment Draft (pUCD). The ATC JC accepted the document as a User Comment Draft via an email ballot completed on August 12, 2022, with a vote of 9 yeas, 0 nays, and 0 abstentions. The minor revision number was advanced to *ATC 5401 v02B.42* for administrative and editorial reasons.

5 COMMENTS LISTING

Comments are currently solicited.

6 COMMITTEE OBJECTIVES

This standard has been developed under the oversight of the ATC Joint Committee which is made up of representatives from the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA). The work in developing this standard was performed by the API Working Group (WG), a technical subcommittee of the ATC JC. The goals of the ATC program are to create a general purpose field computing platform for transportation applications that is:

- a) Open architecture;
- b) Modular;
- c) Multi-process / Multi-application; and
- d) Can grow with advances in technology.

The objective of the API WG is to define the software facilities and functions that, when combined with the operating system (OS) defined in the *ATC 5201 Standard*, forms a user and software interface for application programs designed to run on ATC units. *UCD ATC 5401 v02B.42* defines a software environment that allows multiple application programs to run concurrently on a single controller unit by sharing the fixed resources of the controller and field cabinet system. The API Software facilitates the writing of application programs that can run on any ATC unit regardless of the manufacturer. When an ATC unit is equipped with API Software, it meets the goals of the ATC program.

7 COMMITTEE MEMBERS

This standard has been developed under the oversight of the ATC Joint Committee (JC) which is made up of representatives from the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA). The work in developing this standard was performed by the API Working Group (WG), a technical subcommittee of the ATC JC.

API Working Group

Ralph Boaz, Pillar Consulting
James Brock, North Carolina Department of Transportation
George Chen, Los Angeles Department of Transportation
Jonathan Grant, Yunex Traffic
Matthew Luker, Utah Department of Transportation
Robert Rausch, TransCore
Michael Robinson, California Department of Transportation
Peter Skweres, Minnesota Department of Transportation
Mark Simpson, SWARCO McCain
Tom Spiegel, Econolite
Douglas Tarico, Intelight
John Thai, City of Anaheim
Andy Zhang, WapSync

ATC Joint Committee

Doug Crawford, Q-Free
Alan Davis, Georgia Department of Transportation
Kleinjan Deetlefs, Applied Information
Steve Gault, Pennsylvania Department of Transportation
Matt Luker, Utah Department of Transportation
Dave Miller, Yunex Traffic (Chair)
Robert Rausch, TransCore
Edward Seymour, Texas Transportation Institute
Doug Spencer, Oregon Department of Transportation
Mohamad Talas, New York City Department of Transportation
John Thai, City of Anaheim, CA
Derek Vollmer, Florida Department of Transportation
Jon Wyatt, Parsons

8 OTHER MATERIAL OF INTEREST

“ATC 5201 v06A, *Advanced Transportation Controller (ATC) Standard Version v06A*,” ATC JC, 29 July 2020. Available from the Institute of Transportation Engineers. <https://www.ite.org/technical-resources/standards/>

“ATC 5301 v02, *Advanced Transportation Controller (ATC) Cabinet Standard Version v02*,” ATC JC, 18 March 2019. Available from the Institute of Transportation Engineers. <https://www.ite.org/technical-resources/standards/>

“ATC 5401 v02A, *ATC 5401 Application Programming Interface (API) Standard for the Advanced Transportation Controller (ATC) Version 02A*,” ATC JC, 29 July 2020. Available from the Institute of Transportation Engineers. <https://www.ite.org/technical-resources/standards/>

“*Caltrans Transportation Electrical Equipment Specifications (TEES)*,” California Department of Transportation, 5 November 2020. Available from the California Department of Transportation. <https://dot.ca.gov/programs/traffic-operations/tees>

“*Intelligent Transportation System (ITS) Standard Specification for Roadside Cabinets v01.02.17b*,” ATC JC, 16 November 2006. Available from the Institute of Transportation Engineers. <https://www.ite.org/technical-resources/standards/>

“*ISO/IEC 9899:2018, Information technology -- Programming languages -- C*.” Available from the International Organization for Standardization (ISO).

“*NEMA TS 1-1989, Traffic Control Systems*,” NEMA, 1989. Available from the National Electrical Manufacturers Association.

“*NEMA TS 2-2016, Traffic Controller Assemblies with NTCIP Requirements Version 03.07*,” NEMA, 2016. Available from the National Electrical Manufacturers Association.

9 DECLARATION REGARDING OTHER KNOWN NATIONAL AND INTERNATIONAL STANDARDS

This statement confirms that other known national and international standards have been examined with regard to harmonization and duplication of content, and no significant conflicts with another known standard have been identified.

10 ABSTRACT OF THE STANDARD

Purpose

The Advanced Transportation Controller (ATC) Standards are intended to provide an open architecture hardware and software platform that can support a wide variety of Intelligent Transportation Systems (ITS) applications including traffic management, safety, security, and other applications. The ATC Standards are being developed under the direction of the ATC Joint Committee (JC) which is made up of representatives from the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA).

This document defines a user and software interface for application programs intended to operate on ATC units. It has been prepared by the ATC Application Programming Interface (API) Working Group (WG), a technical subcommittee of the ATC JC. It establishes a common understanding of the user needs, requirements, and specification of the interface for:

- a) The local, state, and federal transportation agencies who specify ATC equipment;
- b) The software developers, consultants, and manufacturers who develop application programs for ATC equipment;
- c) The public who benefits in the application programs that run on ATC equipment and directly or indirectly pays for these products.

Overview

ATC 5401 v02B.42 defines the software facilities and functions (API Software) that, when combined with the operating system (OS) defined in the *ATC 5201 Standard*, forms a user and software interface for multiple application programs to run concurrently on a single ATC unit by sharing the fixed resources of the controller and field cabinet system. API Software also facilitates the writing of application programs that can run on any ATC unit regardless of the manufacturer. When an ATC unit is equipped with API Software, they meet the goals of the ATC program. Figure 1 illustrates the layered architecture for software on ATC units. Figure 2 illustrates how multiple applications can run simultaneously on a single controller unit when using API Software. Figure 3 illustrates how ITS application programs can be compiled to run on ATC units from different manufacturers.

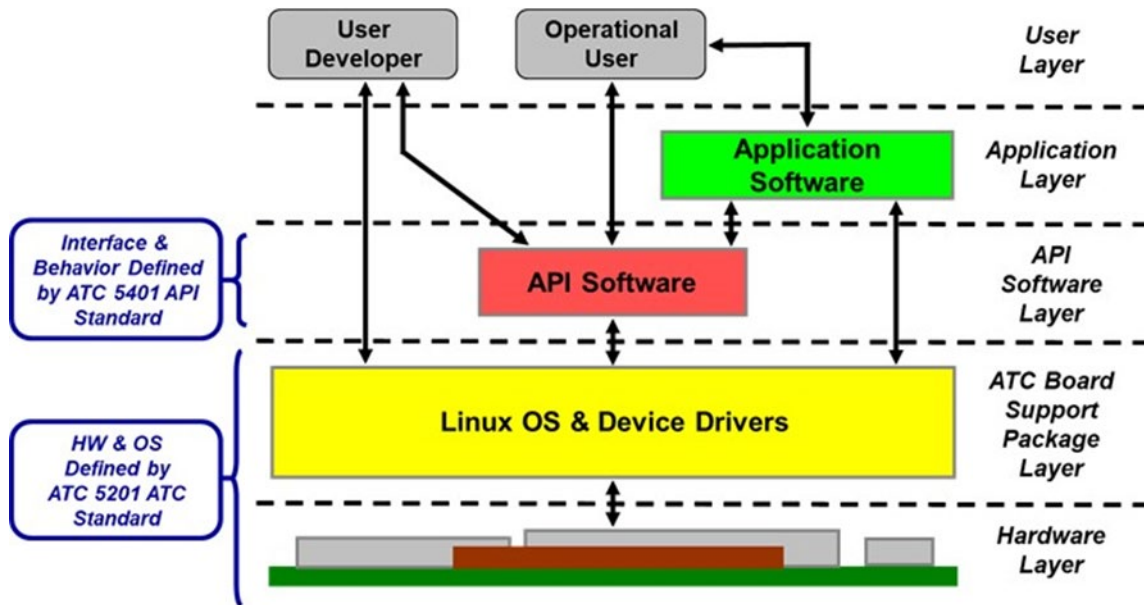


Figure 1. ATC software layered organization.

```

FRONT PANEL MANAGER VER 1.00
SELECT WINDOW: 0-F      SET DEFAULT: *,0-F
0 Camera Control       1 * Intersection Ctl
2 CV Roadside Unit    3 Ramp Meter Cntrl
4                       5
6                       7
8                       9
[MORE - UP/DN ARROW]  [CONFIG INFO - NEXT]
    
```

Figure 2. Example application programs running concurrently on an ATC unit using API Software.

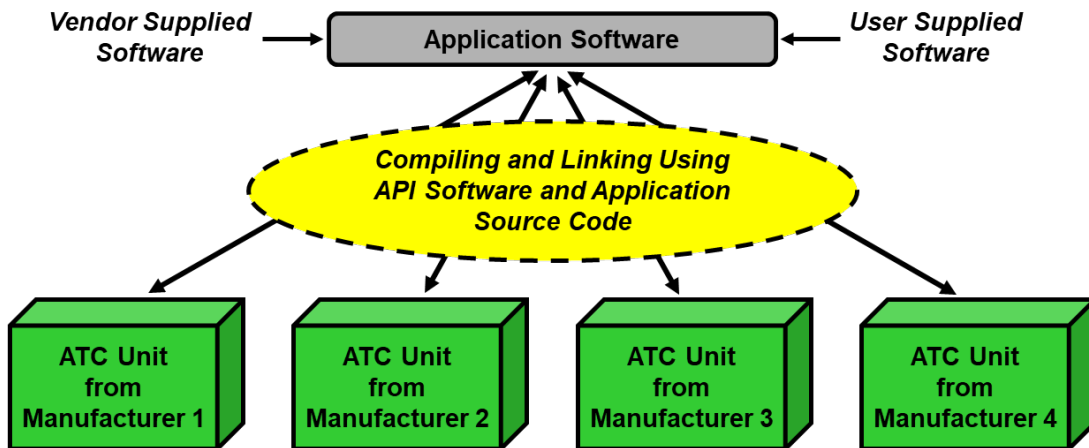


Figure 3. Application program portability using API Software.

Document Organization

UCD ATC 5401 v02B.42 is made up of four sections and three appendices. Section 1, "Introduction", provides an overview of the entire document. Section 2, "Overall Description", provides background information and identifies the user needs for the requirements defined in the subsequent section. Section 3, "Specific Requirements", defines the requirements that must be satisfied by the API Software. Section 4, "Application Programming Interface", specifies the API Software functions. Appendix A of the standard is a traceability matrix showing the relationship between the user needs, the software requirements, and the functions of the API Software. Appendix B provides code examples. Appendix C provides directory structure and file naming conventions.

APPENDICES

Appendix I

User Comment Draft ATC 5401 v02B.42

(See Attachment)

Appendix II

Comment Form for UCD ATC 5401 v02B.42

It is preferred that the attached Excel Comment Form be used to submit comments. However, the form below may also be used.

- **Commenter/Org.** Please identify the commenter and organization submitting the proposed revision.
- **E/S.** Please designate your comments as "E", meaning editorial; or "S" meaning substantive. If you are proposing a clarification to language (without a significant rev in intent), then the proposed rev is "E".
- **DocID/Ver#.** This entry is the version of a draft document against which you are providing the proposed revision. As we move through the project, sometimes section numbers change, and page numbers often change. This helps to locate the proposed revision or cite.
- **Section.** This entry is for the specific Section number of document to which your proposed revision applies. Helps to locate cite within draft (particularly on conference call). If it is in Section 1, then enter "1". If it is in Sec. 5.9.3.5.6.4, then enter 5.3.3.5.6.4. NOTE – If you are proposing a change in term (for example) throughout the draft, enter GEN (for General).
- **Para/Table/Fig.** In a longer Section, it is helpful to know that the proposed rev is in paragraph 8, for example (enter P8). If it is Figure 2-5, then enter "F2-5". If it is Table 3, then enter "T3".
- **Existing Text.** Copy and paste Existing Text from draft. Use ellipses (...), to shorten.
- **Proposed Text.** What text are you proposing? How would you like this section to read? This is also known as "suggested alternative language", meaning that the Working Group will consider this proposal, but may amend in response. It is helpful to actually see the proposed revision so that the Working Group does not have to guess or craft language itself.
- **Reason/Explanation.** What is the purpose of this proposed revision? Examples might be: Clarity. Typo. Include cross-reference. Add functionality. Revise conformance parameters to reflect current industry practice, and accommodate new functionality. This is your opportunity to be persuasive and argue your technical case (briefly).

The following table may be transferred to another document that has thinner margins and column widths may be adjusted to accommodate text.

#	Commenter/Org	E/S	DocID / Ver#	Section	Para/Table/ Fig	Existing Text	Proposed Text	Reason/ Explanation
1			ATC 5401 v02B.42					
2			ATC 5401 v02B.42					
3			ATC 5401 v02B.42					
4			ATC 5401 v02B.42					
5			ATC 5401 v02B.42					
6			ATC 5401 v02B.42					
7			ATC 5401 v02B.42					
8			ATC 5401 v02B.42					
9			ATC 5401 v02B.42					
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12			ATC 5401 v02B.42					
...			ATC 5401 v02B.42					