

Institute of Transportation Engineers
District 6 Annual Meeting
June 20, 2017

Understanding How Advanced Transportation Controllers Are a Key to Our Future

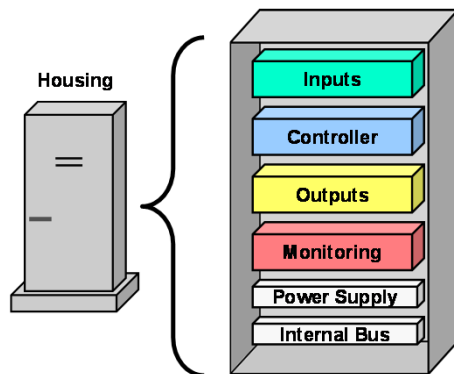
Ralph W. Boaz
rboaz@pillarinc.com



Understanding How Advanced Transportation Controllers Are a Key to Our Future

- **Advanced Transportation Controllers (ATCs)** as defined by ATC 5201 Standard v06
- **Application Programming Interface (API) Software** as defined by ATC 5401 Standard v02

Basic Transportation Field Cabinet System (TFCS) Components

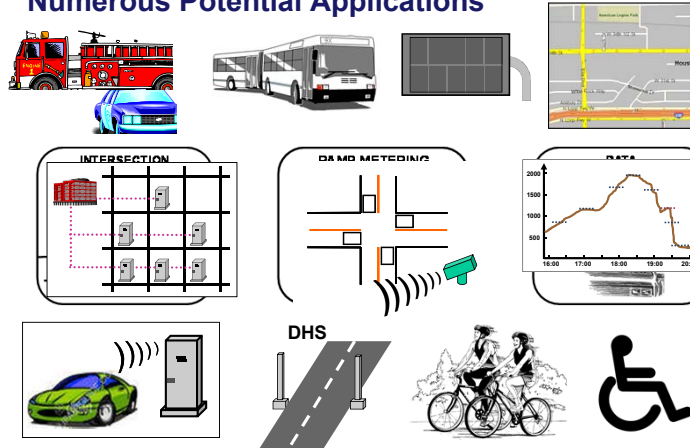


Graphics: Ralph W. Boaz

The Problem with Traditional Controller Models

- **Run one application program** and uses all of the resources of the cabinet system
- **Model 170** and **most Model 2070** controllers **require** particular **obsolete processors**
- **Traditional NEMA TS 1 and TS 2** controllers **not open architecture**
 - Purchase software from the original manufacturer only
- Doing anything other than originally intended is “outside the box”

Numerous Potential Applications



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Purpose of the ATC Family of Standards

- Provide a general purpose field computing platform for transportation applications that is:
 - Open architecture
 - Modular
 - Multi-process / Multi-application
 - Can grow with technology
 - Upgrade legacy transportation cabinet systems

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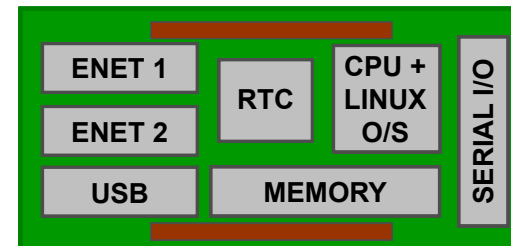
Key Elements of the ATC 5201 Architecture

- Based on an “**Engine Board**” concept
- Engine boards have identical pinout – future boards may plug into existing host boards
- **Computational capability can grow** with technology
- Uses **Linux** operating system
 - Open source, multi-process, multi-application
- Mechanical requirements only for physical interfaces
- Works with **all major transportation field cabinet systems**

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ATC Engine Board Concept

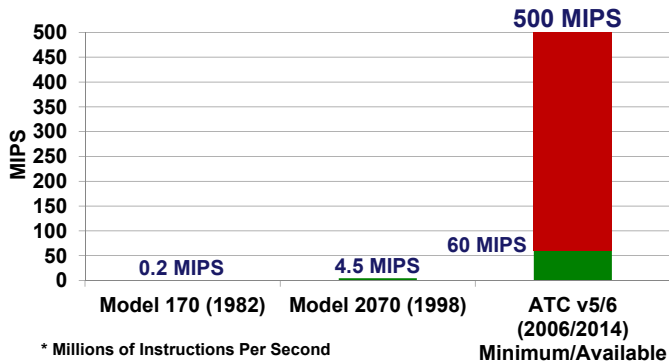


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Transportation Controller Comparative Performance



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Examples of ATC Controller Units

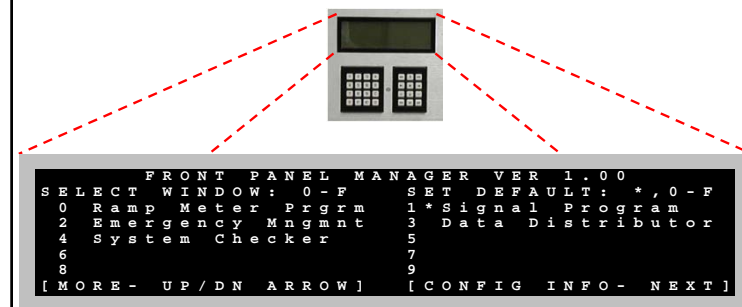


Photos: See Photo Credits

ATC 5401 Application Programming Interface

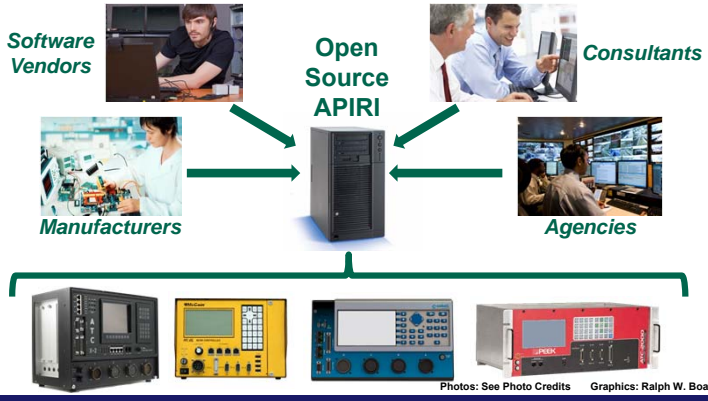
- **ATC 5401 Standard** (aka API Standard) **specifies software** (aka API Software or "the API")
- **API Software** operating on ATC units **allows** concurrently running **application programs to share** the **resources** of the controller and TFCS
- Provides for **source code portability, compatibility and interchangeability** of application software to any ATC unit

Front Panel Manager Window



Graphics: Ralph W. Boaz

Open Source API Reference Implementation (APIRI)



Photos: See Photo Credits Graphics: Ralph W. Boaz

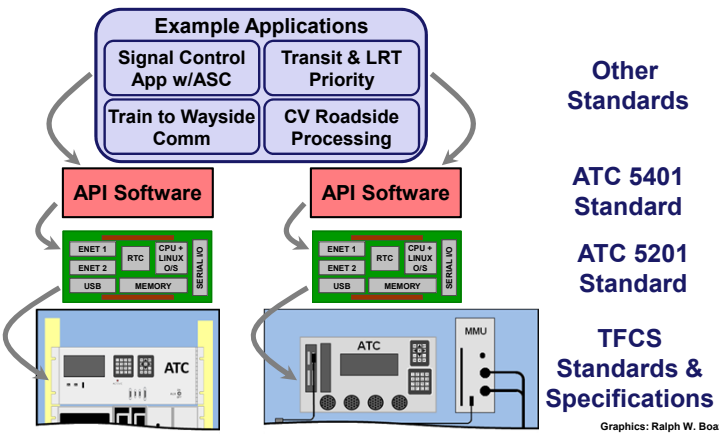
https://github.com/apiradmin/APIRI

The screenshot shows the GitHub repository page for 'apiradmin / APIRI'. Key elements include:

- Repository name: apiradmin / APIRI
- Statistics: 118 commits, 1 branch, 0 releases, 4 contributors, LGPL-2.1 license.
- Recent commit: 'apiradmin committed on GitHub Merge pull request #48 from gallagim/master' dated Oct 31, 2016.
- Commit list:
 - apps: Add signal handling for fpu interface. (a year ago)
 - docs: Add the "APIRI WG Update Proposals" document previously discussed by the... (a year ago)
 - fpu: fiodriver: correction to resend existing input configuration and not... (10 months ago)
 - fpu/FrontPanelSystem: Merge pull request #48 from gallagim/master (8 months ago)
 - include: Move atch file to top-level include directory and fix Makefiles. (a year ago)
 - tod/src: tod: attempt to implement tod_set_dst_state() in a sensible way for L... (a year ago)
 - utils/timesrc: Move atch file to top-level include directory and fix Makefiles. (a year ago)

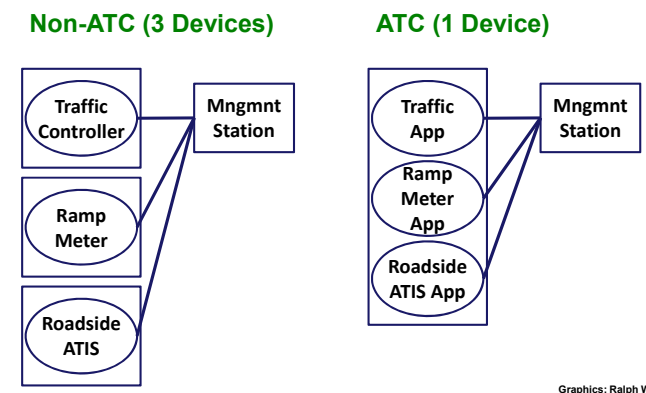
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Portable and Compatible Application Software



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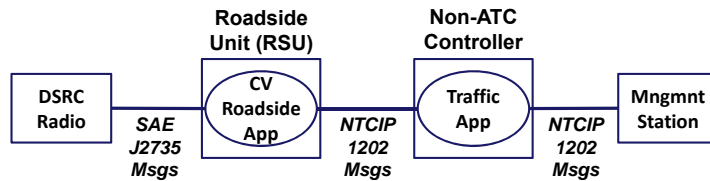
Finding new ways to solve problems



Graphics: Ralph W. Boaz

Finding new ways to solve problems

Connected Vehicle Architecture

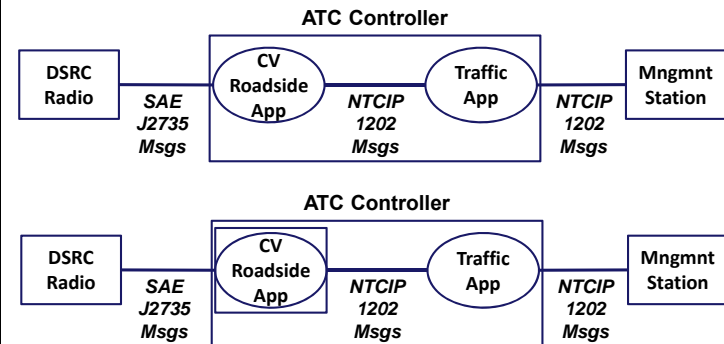


DSRC Dedicated Short Range Communications
 SAE J2735 Society of Automotive Engineers DSRC Message Set Dictionary
 NTCIP 1202 National Transportation Communications for Object Definitions for Actuated Traffic Signal Controller (ASC) Units

Graphics: Ralph W. Boaz

Finding new ways to solve problems

Alternative Connected Vehicle Architectures



Graphics: Ralph W. Boaz

We need your help to get the word out!

- **Model 170** controllers must be **replaced**
- **Model 2070** controllers must have **2070-1C modules**
- ATCs can be deployed incrementally
- Develop migration plans – lots of options
- Lead your vendors in the way they should go. Specify:
 - 1) **Controllers that conform to ATC 5201 Standard v06**
 - 2) **API Software that conform to ATC 5401 Standard v02**

If you spec it, they will come!

Resources

- ATC 5201 Standard v06
www.ite.org/standards/ATCcontroller/ATC5201v06.asp
- ATC 5401 Standard v02
www.ite.org/standards/index.asp
- ATC API Reference Implementation
www.ite.org/standards/atcapi/referenceimplementation.asp
- USDOT ITS Professional Capacity Building (PCB) Program
www.pcb.its.dot.gov
- National Transportation Communications for ITS Protocol
www.ntcip.org/library/documents



Ralph W. Boaz
President

Pillar Consulting, Inc.
4511 Jicarillo Avenue
San Diego, CA 92117
858-352-6281
rboaz@pillarinc.com
www.pillarinc.com