An Introduction to the Advanced Transportation Controller Cabinet (ATCC)

Intelligent Transportation Society of Arizona

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Topics

- Cabinet Overview
- Brief Development History
- Design Objectives
- Features and Benefits
- Assemblies & Components
- Current Status

Cabinet Overview

- The ATCC is an open architecture traffic control cabinet based on the ITE/NEMA AASHTO ITS Cabinet v1 standard.
- It offers significant improvements to conventional cabinets in modularity and compact size, motorist safety, technician safety, and diagnostics.
- This cabinet is intended to update or replace all cabinet types; NEMA TS-1, NEMA TS-2, and Caltrans 33x.

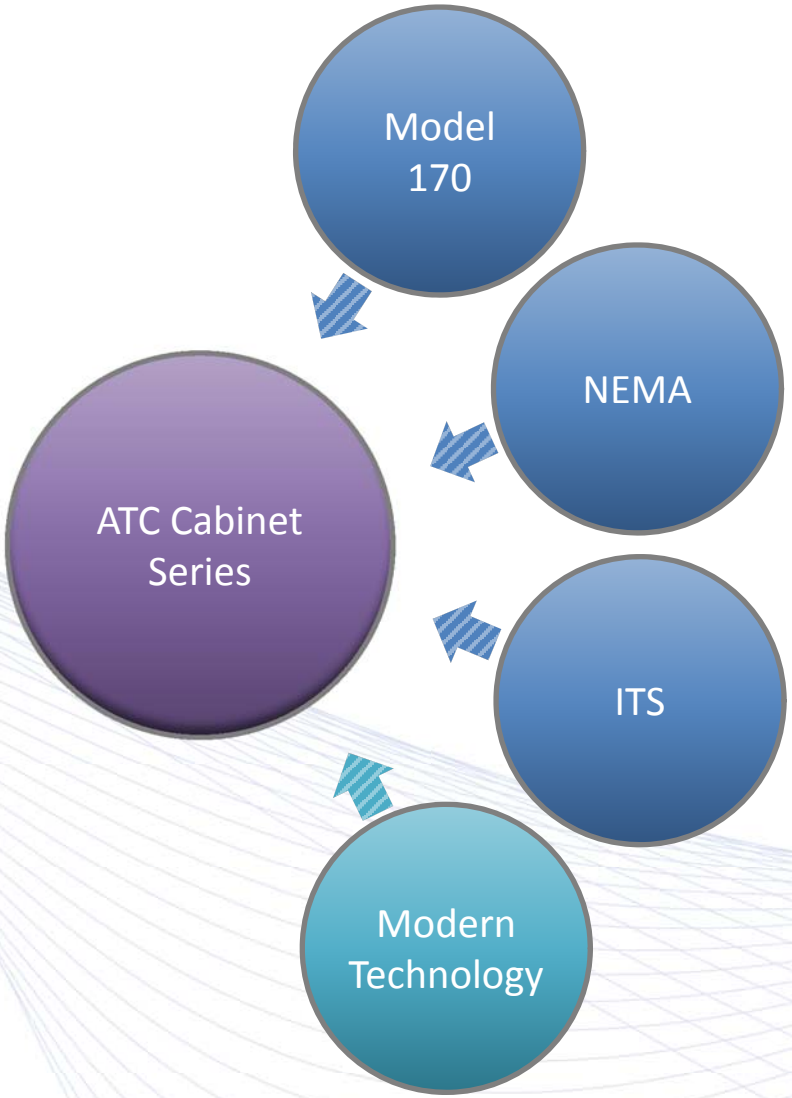
Cabinet Overview

Best of All Worlds

- Combines existing standards and the latest technological advancements to increase cabinet reliability, functionality, and ease of maintenance.

Why “ATC”?

- The ATCC Standard is a component of the ITE/NEMA/AASHTO suite of ATC standards. It is intended to update the ITS Cabinet standard v1 to version 2.



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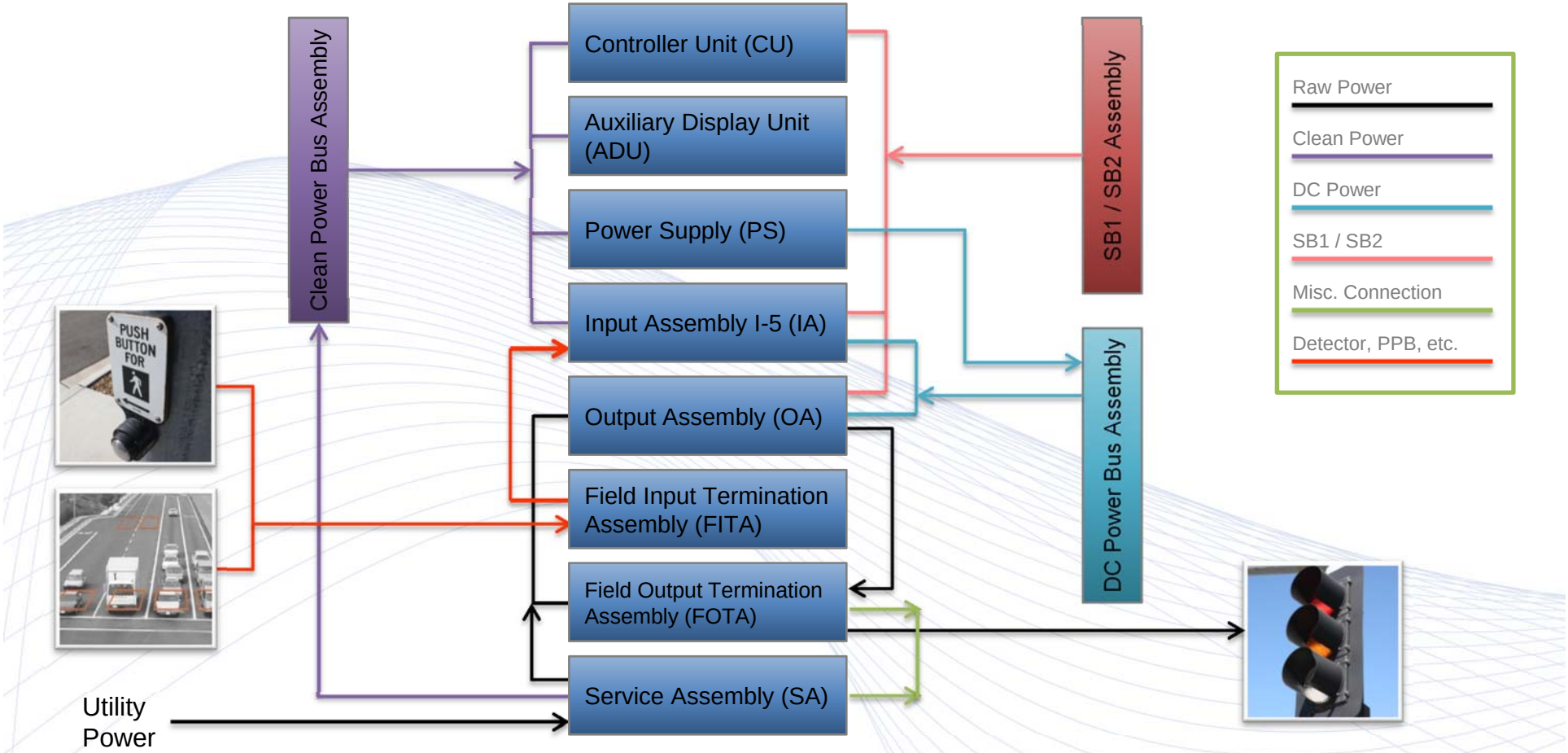
ATCC Block Diagram



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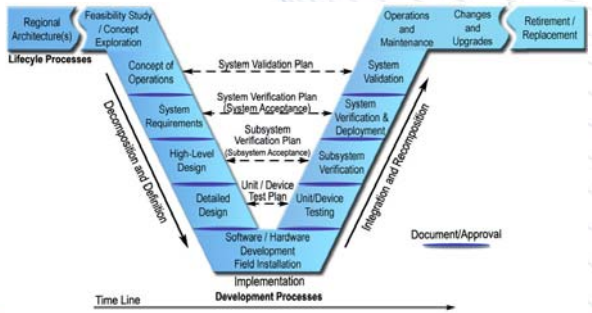
Brief Development History

- The ATCC *architecture* is based on the ITS Cabinet ITE/NEMA/AASHTO Standard v01.02.17b, published in 2006.
- This next phase ATCC work (v2) was developed using the FHWA Systems Engineering Process to develop the Concept of Operations (ConOps), Systems Requirements, capture user needs and requirements, and produce a high level design.
  - USDOT Work Order 14-0701, Tasks 7-12
- Goal of the v2 project was to refine v1 and adapt the lessons learned, and to support low voltage DC operation.
- In 2011 the WG lost funding and three manufacturers continued the program to bring the high level design to the detail level and produce working equipment.



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Design Objectives

- Compact size
- LED signal compatibility
- Motorist & Technician Safety
- Modular rack mounted configurable design
- Accommodate large or multiple intersections
- Low Voltage Operation

ATCC Features (Size)

Put twice the equipment in the same space or the same equipment in half the space.

- Compact double density size, 19” rack mounted
- 16 or 32 channel Output capacity (16 channels shown)
- 120 channel Input capacity
  - 48 channel quad-density input assembly option

ATCC Features (LED Signals)

The ATCC Output technology is an *enabler* for higher energy efficiency.

- True Ultra low power LED compatibility, load switches will support Ultra low power LED signals less than 2 watts.
- Higher energy efficiency within the cabinet, load switches utilize FET devices minimizing heat and waste, no leakage current.
- Battery backup becomes more cost effective.

ATCC Features (Safety)

- Motorist Safety
  - Load current monitoring will detect a dark approach *immediately*.
  - TS-2 MMU level of diagnostics and beyond.
- Numerous improvements for Fail-Safer design
  - Flasher Output Monitor
  - CMU Output Override
  - 24Vdc override
  - All assemblies except FOTA and SA can be replaced with intersection still in flash
  - Pluggable surge protection on Mains, Inputs, and Outputs
- Technician Safety
  - High voltage components are not exposed, per NEC
  - Low Voltage cabinet further promotes Technician safety in the cabinet, as well as citizen safety when downed wires are present.

ATCC Features (Architecture)

- Modular Assembly design
  - Modular construction facilitates a wide variety of configurations and allows for future expansion
- Competitive Procurement
  - Open architecture allows for interchangeable assemblies and components between manufacturers
  - Same cabinet design can support both 120 Vac and 48 Vdc operation.
- Easily handle advanced operations:
  - Adaptive
  - Bicycle detection
  - Count data
  - Texas Diamond
  - RWIS, etc….

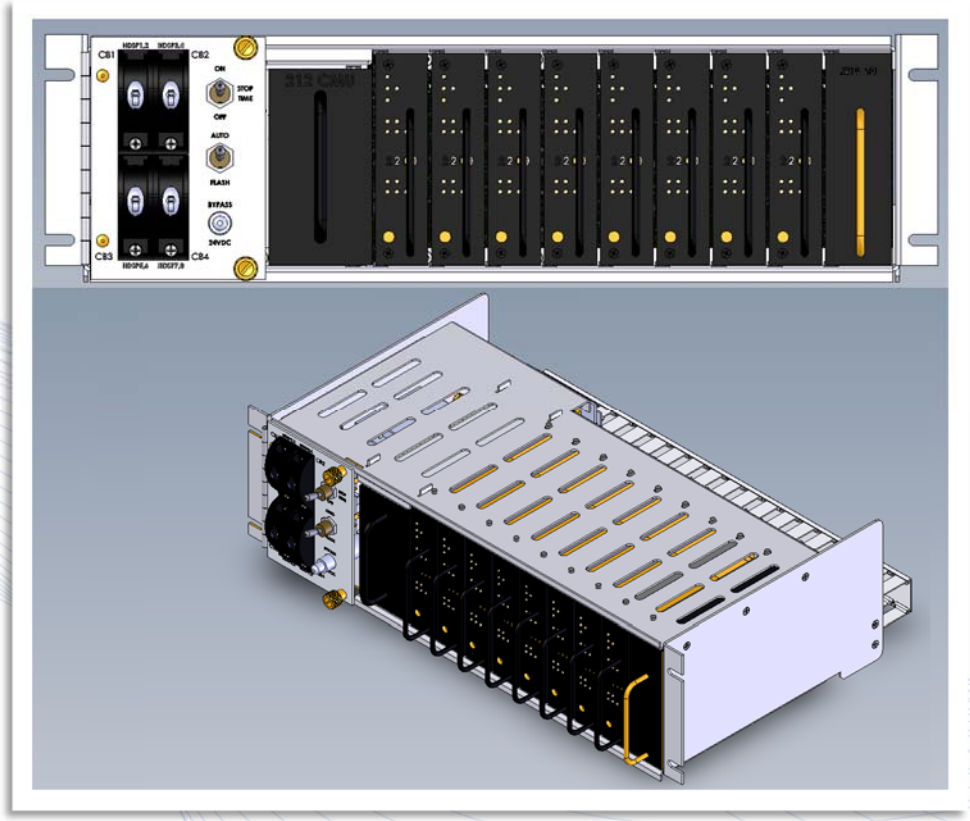
ATCC Assemblies

- 19” or 14” Rack Mounted Modular System
  - ATC Controller with Serial Bus
  - Input Assembly
  - Output Assembly
  - Serial Bus / DC Bus Cable Assembly
  - AC Clean Power Cable Assembly
  - Input and Output Termination Panels

Output Assembly

Output Assembly Houses

- Model 2212 cabinet monitor unit (CMU2)
- Model 2218 serial interface unit (SIU2)
- Model 2202 high-density switch pack (HDSP)
- Main contactor (MC)
  - 48 VDC coil
  - Mercury-free



ATCC Key Components

- Cabinet Monitor Unit (CMU2)
- Auxiliary Display Unit (ADU)
- High Density Switch Pack / Flasher Unit (HDSP-FU)
- Serial Interface Unit (SIU2)
- Cabinet Power Supply (PS)
- High Density FTR

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ATCC Components (High Density Switch Pack)

- Card based Two Channel Load Switch, interchangeable with the Four Output Flasher
- Output Voltage and Current measured for each output (6), reported to CMU via SB#3
  - Six outputs rated at 5 mA to 1 Amp (1-120 watts)
- LED compatible to <2 watts, no leakage
- CMU controlled output over-ride for fail-safer operation
- “ID” indicators driven by CMU based diagnostics for simplified trouble-shooting
- 120 Vac (HV) and 48 Vdc (LV) versions

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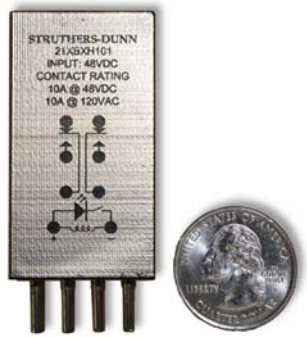
ATCC Components (Misc)

- HD Flash Transfer Relay
  - Hermetically sealed nitrogen enclosure
  - LED indicator reports actual contact status
  - DC coil voltage
- Pluggable SHA1250 Surge/Filter
- Pluggable Input and Output Transient protection devices



DC Low Voltage Configuration

The ATC Cabinet design directly supports Low Voltage DC operation (48 VDC).

- Spend less on PPE requirements
- Improved operational efficiencies
- Component costs are reduced
- Reduce liability risks
- Minimize regional electrician licensing issues

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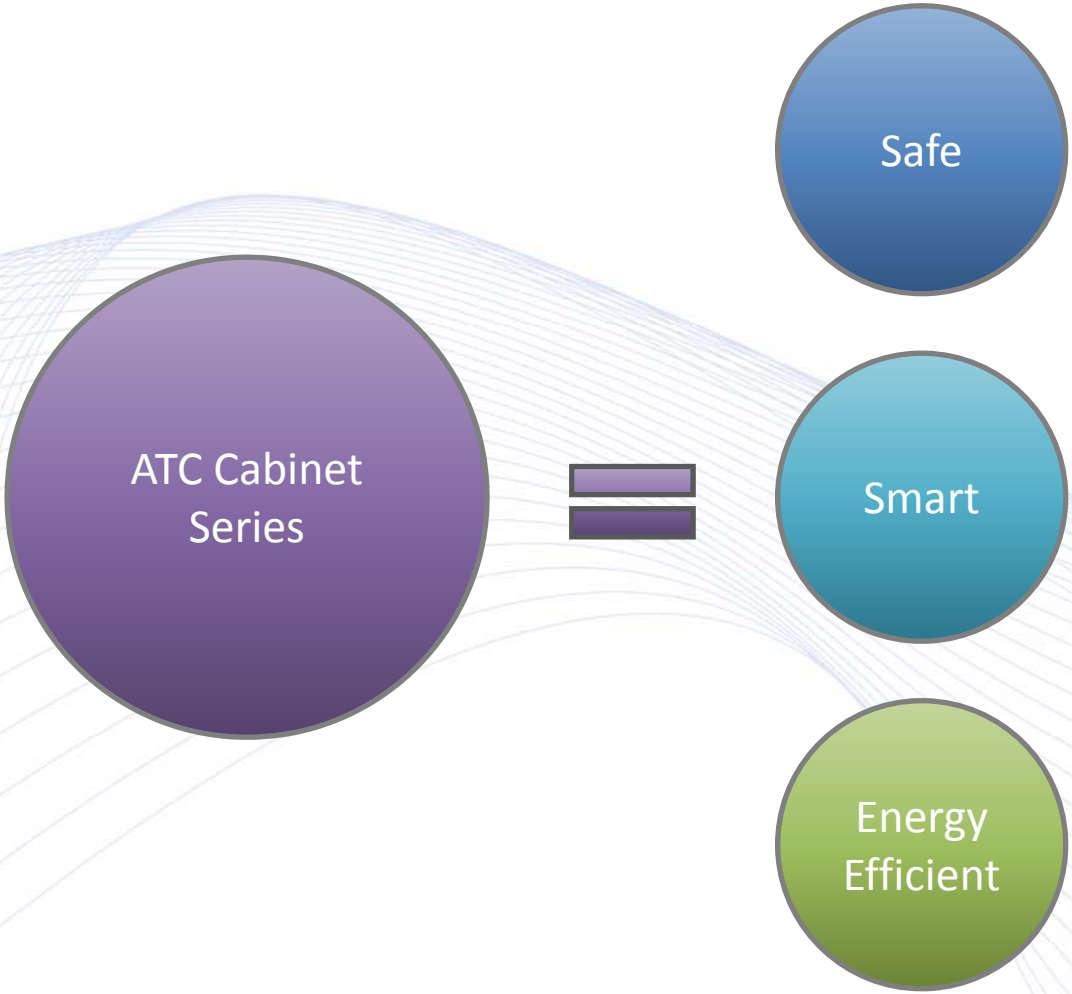
ATCC Summary



Fail-safer design is safer for drivers & workers.

Compact, HD components provide increased capabilities in ½ the space.

Designed for LEDs. Ready to migrate to low-voltage 48 VDC operations.

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ATCC Status

- Equipment Availability
  - Two OEM manufacturers in production (HV & LV)
  - Two other OEM manufacturers in design
- Several projects already deployed
- Six CU local software suppliers
  - two currently qualified for ATCC software
- Standards document in draft development
- Funding is being secured to reinstate the ITE/NEMA/AASHTO Working Group to complete the ATCC Standard

ATCC Contacts

Q&A

- Eberle Design www.EDItraffic.com
- Intelight www.Intelight.com
- McCain www.McCain-inc.com
- Struthers-Dunn www.struthers-dunn.com
- Eagle Traffic www.eagletrafficcontrolsystems.com
- Econolite www.Econolite.com

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