

ATCA Shelf Manager Controls & Monitoring

Status of AtcaOpcUa server and Integration in DCS Applications

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Outline

- Intro: ATLAS ATCA DCS Scheme
- Plans set in 14 xTCA Interest Group Meeting
 - Progress on AtcaOpcUa Server
 - Integration with WinCC OA
 - Integration with ATLAS FSM
 - Use cases in ATLAS
 - Conclusions

Introduction

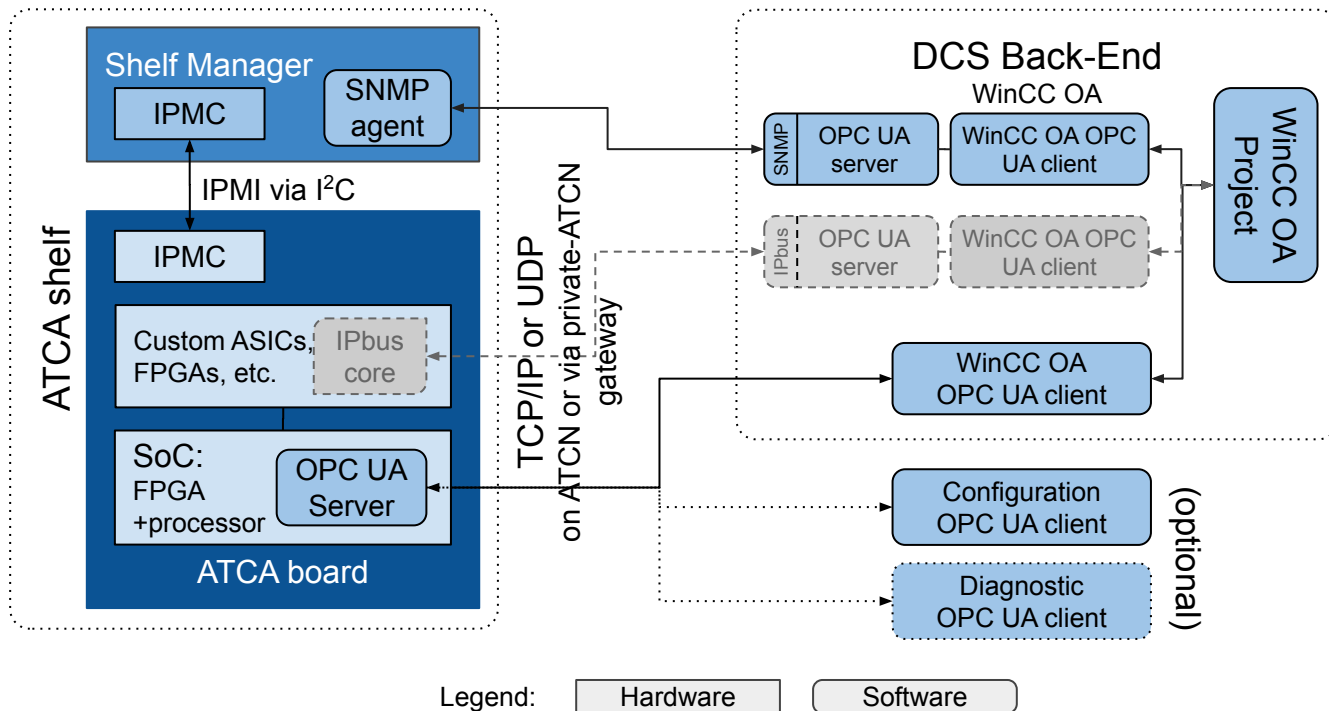


Diagram from S. Schlenker
 DCS: Requirements Document for HL-LHC
 EDMS Id: 2276493 v.1

ATLAS Off-Detector Electronics Based on ATCA

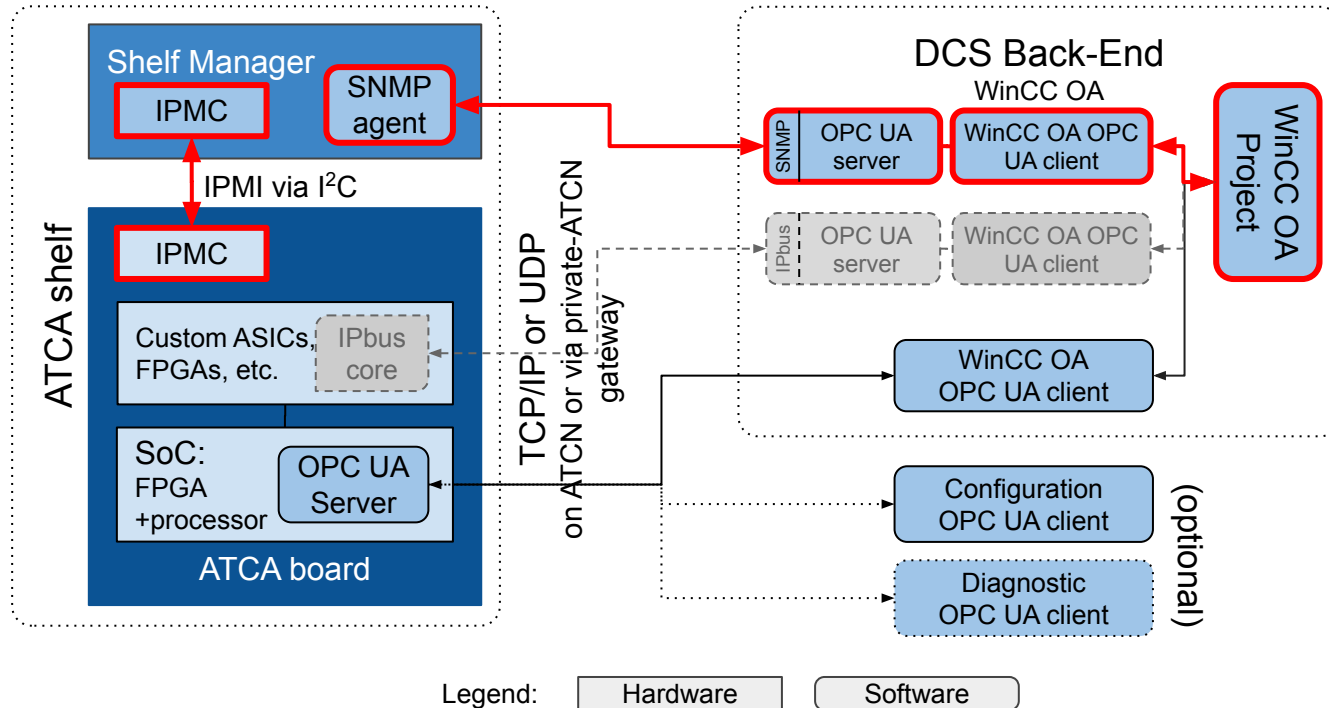


Diagram from S. Schlenker
 DCS: Requirements Document for HL-LHC
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14th xTCA Interest Group Meeting - Plans

- Plans from last year's xTCA meeting:

Plans

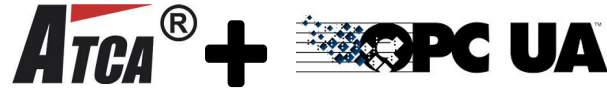
- Automate common deployment procedures
 - including device **discovery**
 - **creation** of the **configuration file** based on the discovered devices
- Expand device support and custom sensors to **more sensor types**
- Easy **integration to WinCC OA** with a dedicated framework component
 - fwAtca for ATCA OPC UA

14th xTCA Interest Group Meeting 10.05.2019

AtcaOpcUa Server

Why combining ATCA with OPC UA?

- OPC UA
 - focuses on communicating with industrial equipment and systems for data collection and control
 - Open specification and various implementations available (free or commercial)
 - Cross-platform
 - Service-oriented architecture
 - Integral information model, which is the foundation of the infrastructure necessary for information integration where vendors and organizations can model their complex data into an OPC UA namespace



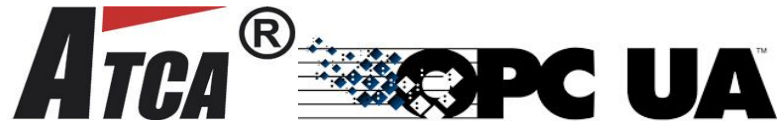
- Current experience with OPC UA @CERN
 - **Works natively** with the tools used in Detector Control Systems
 - ATLAS DCS and BE-ICS developed a framework, quasar, for developing OPC UA servers
 - It is the standard **preferred** by the “**big**” **vendors** (e.g. CAEN, ISEG, Weiner, etc.) for their power supply devices
 - It is used by various custom devices in experiments used widely at CERN (ELMB, SoC)
 - CERN foresees to have **support** and provide **maintenance** on those solutions on the long term through the quasar framework



AtcaOpcUa Server for ShM management

Basic Points

- A quasar OPC UA server for managing ATCA shelves via the **shelf manager path** based on the **SNMP** external interface to monitor/control activities using IPMI
- For “CERN-standard” **Pigeon Point Shelf Managers** (ShMM 500, ShMM 700R)
 - Compatible with **xTCA**
- The ATCA Software is **template**-based on the MIB and auto **generated** using Jinja2
- Provides automatic **hardware discovery** walking over the SNMP tree
 - Only existing entries are populated
 - Throttling traffic towards for specific sensor types



AtcaOpcUa

Traffic Handling Improvements

ATCAs that are highly populated by sensors/IPMC/boards can congest IPMB towards the shelf manager.

- ~O(100) of variables can be handled smoothly for individual shelves
- That is one of the reasons for the second path (SoC)

To ensure smooth traffic

- A **survey** has been conducted within ATLAS ATCA shelves users to prioritize data relevant to DCS monitoring over excessive information and **based on the feedback from the community** in-server polling groups were used to categorize sensors (and their variables) with different priorities
- Support for a selection of advanced variables was introduced
- The server, while supporting all basic variables, by default populates the DCS-important ones during automatic discovery
- Introduced support for TELCO alarms which can capture and inform of emergency situations
 - Automatic actions based on alarming events should be done within-shelf manager using Platform Event Filtering mechanism

SNMP module for OPC UA

- An **ongoing effort** to provide a generalized C++ module has been initiated by Central DCS team that can be reused for various **SNMP-based devices** requiring control and monitoring using **OPC UA** solutions
- This module is **based on the AtcaOpcUa** server software backend experience
- The main motivation is to provide a commonalized way of interfacing to
 - Phase-II upcoming **power supplies** that use standard SNMP
 - the **AC/DC power rectifier** systems for ATCA shelves that are foreseen to be procured by centrally by CERN. It is actually part of CERN requirements
- **Work-In-Progress** in collaboration with BE-ICS to ensure long term maintenance



AtcaOpcUa

Design Model Visualization



OPC UA CLIENTS
UaExpert, WinCC OA

UA ADDRESS SPACE

DEVICE LOGIC + ATCA SW

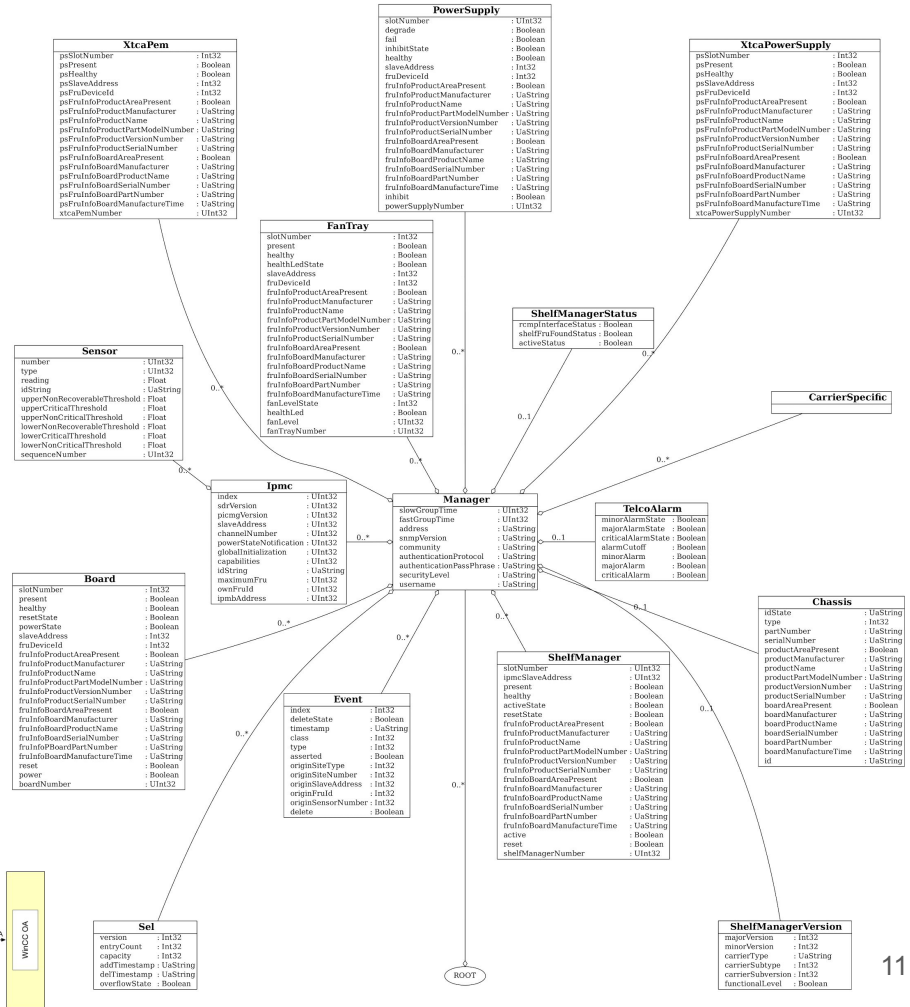
SNMP-API

Atca Server

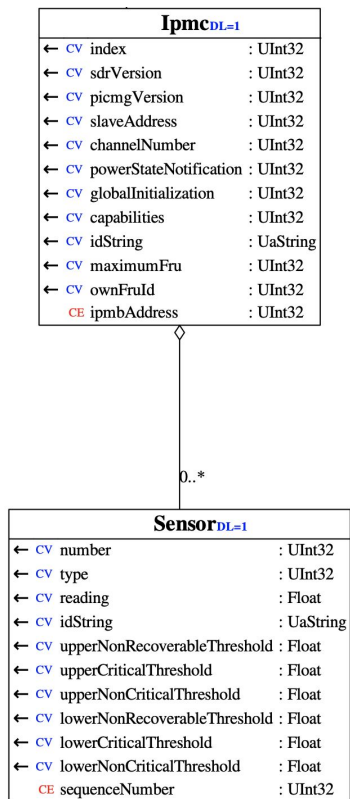
ATCA AGENT
Atca ShMM

ATCA AGENT
Atca ShMM

ATCA AGENT
Atca ShMM



IPMC and sub-detector specific hardware



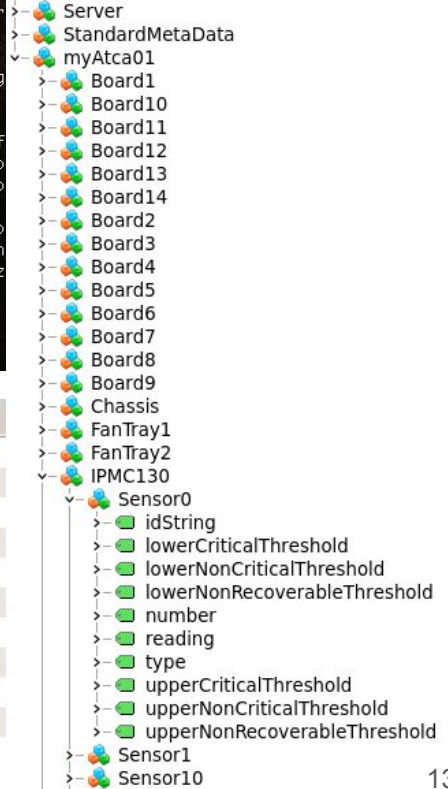
- Generic representation of IPMC and sensors following the hardware representation
 - Sensors “belong” to IPMCs
- Any **IPMC** that conforms with the standard can be monitored
 - The connected custom **sensors** are also monitorable using their IPMC address and sequence number
- A sophisticated mechanism that distinguishes in-between types of sensors was developed
 - temperatures, voltages, fans speed etc
 - sensor types enriched
 - mechanism to facilitate **addition** of ad-hoc types of sensors was introduced
- IPMC and sensors are **automatically discovered** and populated into the server

The AtcaOpcUa server in action

```

2020-03-02 09:34.40.416591 [MetaAmalgamate.cpp:3200, INF] StandardMetaData.Log configuration found in the configuration file, configur
2020-03-02 09:34.40.416661 [MetaAmalgamate.cpp:3133, INF] general non-component log level will be [INF]
2020-03-02 09:34.40.416743 [MetaAmalgamate.cpp:2578, INF] setting log level to [INF]
2020-03-02 09:34.40.416813 [MetaAmalgamate.cpp:3118, INF] no StandardMetaData.Log.ComponentLogLevels configuration found in the config
2020-03-02 09:34.40.416900 [MetaAmalgamate.cpp:3069, INF] configuration for logging component handle [0] name [CalcVars] using value
2020-03-02 09:34.40.417015 [MetaAmalgamate.cpp:2516, INF] setting component [name:CalcVars id:0] to level [INF]
2020-03-02 09:34.40.417101 [MetaAmalgamate.cpp:3219, INF] no StandardMetaData.SourceVariableThreadPool configuration found in the conf
2020-03-02 09:34.40.417763 [MetaAmalgamate.cpp:3236, INF] no StandardMetaData.Quasar configuration found in the configuration file, co
2020-03-02 09:34.40.417852 [MetaAmalgamate.cpp:3250, INF] no StandardMetaData.Server configuration found in the configuration file, co
2020-03-02 09:34.40.418049 [SnmpBackend.cpp:64, INF] [asmlic-stf0.cern.ch] Using SNMP version 2c
2020-03-02 09:34.40.438717 [CalculatedVariablesEngine.cpp:262, INF, CalcVars] #ParserVariables: 1181 #CalculatedVariables: 0 #Synchro
2020-03-02 09:34.40.439041 [CalculatedVariablesEngine.cpp:297, INF, CalcVars] Optimized(suppressed) 1181 ParserVariables not used in an
2020-03-02 09:34.40.439104 [CalculatedVariablesEngine.cpp:262, INF, CalcVars] #ParserVariables: 0 #CalculatedVariables: 0 #Synchroiz
2020-03-02 09:34.40.439149 [QuasarServer.cpp:78, INF] Initializing Quasar server.
2020-03-02 09:34.40.441714 [opcserver.cpp:157, INF] 0pened endpoint: opc.tcp://pcaticstest08.dyndns.cern.ch:48050
2020-03-02 09:34.40.441777 [QuasarServer.cpp:48, INF] Server main loop started!
    
```

Node Id	Display Name	Value	Datatype	Source Timestamp	Server Timestamp	
NS2 String myAtca01.IPMC92.idString	idString	Upper Fan Tray	String	9:38:28.522 AM	9:38:53.592 AM	Good
NS2 String myAtca01.IPMC92.Sensor10.idString	idString	Fan Tach 2	String	9:38:38.244 AM	9:39:25.453 AM	Good
NS2 String myAtca01.IPMC92.Sensor10.reading	reading	5400	Float	9:41:16.578 AM	9:41:16.578 AM	Good
NS2 String myAtca01.IPMC92.Sensor11.idString	idString	Fan Tach 3	String	9:38:38.738 AM	9:39:46.154 AM	Good
NS2 String myAtca01.IPMC92.Sensor11.reading	reading	5460	Float	9:40:17.874 AM	9:40:17.874 AM	Good
NS2 String myAtca01.IPMC92.Sensor9.idString	idString	Fan Tach 1	String	9:38:37.442 AM	9:40:10.623 AM	Good
NS2 String myAtca01.IPMC92.Sensor9.reading	reading	5460	Float	9:41:16.504 AM	9:41:16.504 AM	Good
NS2 String myAtca01.IPMC92.Sensor8.idString	idString	Temp Out Right	String	9:38:36.907 AM	9:40:18.490 AM	Good
NS2 String myAtca01.IPMC92.Sensor8.reading	reading	19	Float	9:40:17.303 AM	9:40:22.683 AM	Good
NS2 String myAtca01.IPMC92.Sensor7.idString	idString	Temp Out Center	String	9:38:35.835 AM	9:40:26.703 AM	Good
NS2 String myAtca01.IPMC92.Sensor7.reading	reading	22	Float	9:41:16.301 AM	9:41:16.301 AM	Good



Integration with WinCC OA

WinCC OA and Integration Objectives



- **Standard** at CERN for Detector Control Systems
- Commercial and custom detector hardware is monitored and controlled through it
- It is the **interface** to the **shifter** in the control room
- Provides **interface to OPC UA servers** and integrates well with it

Objectives:

- ATCA shelves that use AtcaOpcUa should be **integrated** into the DCS
- Provide **monitoring** via WinCC OA UI
- Include **archiving** of **historical data** and **alarm** handling

Further ATLAS objectives:

- Integrate in **ATLAS FSM tree** structure

WinCC OA data availability

fwAtca



SIEMENS
v8.4.0 (11-FEB-2020)

- WinCC OA integration is done by the **fwAtca** tool (uses fwQuasar)
- It **creates datapoints** for the **discovered hardware** based on the automatically created xml of the AtcaOpcUa server
- By default and **optionally creates additional configuration** for the datapoints including
 - Archiving
 - Alarms
 - Descriptions

The screenshot shows the fwAtca tool interface. At the top, it displays the title 'fwAtca' and the version 'v8.4.0 (11-FEB-2020)'. Below the title bar, there is a text field for 'Select configuration xml' with the path '/localdisk/winccoa/ATLTSTATCA/config_discovered_ATCA.xml' entered. To the right of the text field are the ATCA and OpcUa logos. The main area contains a tree view of the configuration files, starting with 'ATLTSTATCA' and listing various sub-items like 'fwAtcaBoard', 'fwAtcaCarrierSpecific', 'fwAtcaChassis', 'fwAtcaEvent', 'fwAtcaFanTray', 'fwAtcalpmc', 'fwAtcaManager', 'fwAtcaPowerSupply', 'fwAtcaSel', and 'fwAtcaSensor'. The 'fwAtcaSensor' folder is expanded, showing a list of sensors such as 'myAtca01/IPMC130/Sensor0' through 'Sensor13'. At the bottom of the interface, there is a control panel with four buttons: 'Create Datapoint Types', 'Create datapoints', 'Delete Datapoint Types', and 'Delete Datapoints'. To the right of these buttons is a section titled 'When creating datapoints' with several checkboxes: 'Activate addresses' (checked), 'Create default descriptions' (checked), 'Create default alarms' (unchecked), 'Activate alarms' (unchecked), 'Create default archives' (unchecked), and 'Activate archiving' (unchecked). At the very bottom, there is a log window showing the following messages: 'Datapoints deleted successfully.', '[INFO] Chosen path: /home/pmoschov/myGitRepos/fwAtca/scripts/libs/fwAtca/fwAtcaConfigParser.ctl', '[INFO] Datapoints created successfully!', and '[INFO] Initialized descriptions successfully!'.

WinCC OA data availability



SIEMENS

- fwAtca provides a **library with helper** functionality intended for use in sub-detector DCS experts **custom scripts**
- Functionality to set **alarm** limits on sensors **based on hardware defined thresholds** (non-critical, critical, non recoverable)
 - Communication to the hardware is required

WinCC OA Para Module

Local Temp

Datapoint/Comment	Value	Bits	Time
myAtca01 IPMC16 Sensor2 idString	Local Temp	-----	2020.03.02 11:38:04.1...
myAtca01 IPMC16 Sensor2 lowerCritical	0	-----	2020.03.02 11:38:04.1...
myAtca01 IPMC16 Sensor2 lowerNonCritical	0	-----	2020.03.02 11:38:04.1...
myAtca01 IPMC16 Sensor2 lowerNonRecoverable	0	-----	2020.03.02 11:38:04.1...
myAtca01 IPMC16 Sensor2 number	2	-----	2020.03.02 11:38:03.8...
myAtca01 IPMC16 Sensor2 reading	19	-----	2020.03.02 11:37:02.3...
myAtca01 IPMC16 Sensor2 type	1	-----	2020.03.02 11:38:04.1...
myAtca01 IPMC16 Sensor2 upperCritical	60	-----	2020.03.02 11:38:04.1...
myAtca01 IPMC16 Sensor2 upperNonCritical	50	-----	2020.03.02 11:38:04.1...
myAtca01 IPMC16 Sensor2 upperNonRecoverable	75	-----	2020.03.02 11:38:04.1...

- Board2
- Board3
- Board4
- Board5
- Board6
- Board7
- Board8
- Board9
- Chassis
- FanTray1
- FanTray2
- IPMC130
 - Sensor0
 - idString
 - lowerCriticalThreshold
 - lowerNonCriticalThreshold
 - lowerNonRecoverableThreshold
 - number
 - reading
 - type
 - upperCriticalThreshold
 - upperNonCriticalThreshold
 - upperNonRecoverableThreshold
 - Sensor1
 - Sensor10

Information as exposed by the AtcaOpcUa server

fwAtca

Select configuration xml:

ATCA

ATLTSTATCA

- fwAtcaBoard
- fwAtcaCarrierSpecific
- fwAtcaChassis
- fwAtcaEvent
- fwAtcaFanTray
- fwAtcalpmc
 - myAtca01/IPMC130
 - myAtca01/IPMC16
 - myAtca01/IPMC32
 - myAtca01/IPMC90
 - myAtca01/IPMC92
- fwAtcaManager
- fwAtcaPowerSupply
- fwAtcaSel
- fwAtcaSensor
 - myAtca01/IPMC130/Sensor0
 - myAtca01/IPMC130/Sensor10
 - myAtca01/IPMC130/Sensor11
 - myAtca01/IPMC130/Sensor12
 - myAtca01/IPMC130/Sensor13

Create Datapoint Types | Create Datapoints | Delete Datapoint Types | Delete Datapoints

When creating datapoints:
 Activate addresses
 Create default descriptions
 Create default alarms
 Activate alarms
 Create default archives
 Activate archiving


fwAtca tool UI

Integration with ATLAS FSM

ATLAS FSM integration

fwAtcaFsm

- Many sub-detectors with suchlike (CERN-standard) ATCA setups that need to integrate with ATLAS FSM
- A **common centralized way** of generating the ATLAS FSM tree for all ATCA was chosen, allowing for custom user extensions
- The motivation is to provide easy **uniform monitoring** (bottom to top state/status propagation)
- To allow shifters have an overview with a **nicely informative visual interface**
- The **fwAtcaFsm** tool **automates** the tedious **development** procedure by additionally
 - **Identifying** the sub-detector it is deployed into
 - **Handling** the **FSM tree states** during creation
 - **Creating the** sub-detector specific **ATCA FSM** tree based on its discovered hardware
 - Generate, Start, examine the FSM tree etc.



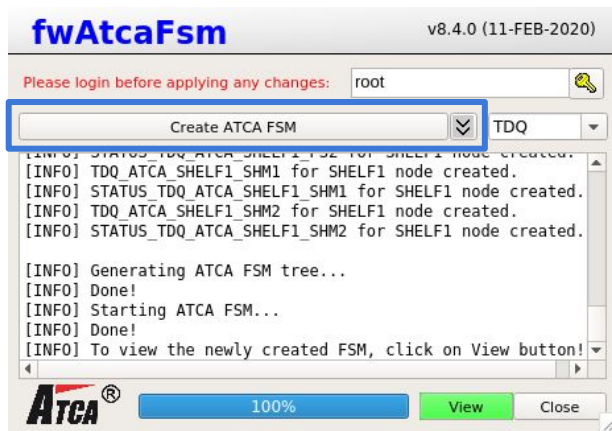
DEV ATCA

ATCA SHELF 1	UNHEALTHY	OK	
BOARD 1	OFF	OK	✓
BOARD 10	OFF	OK	✓
BOARD 11	OFF	OK	✓
BOARD 12	OFF	OK	✓
BOARD 13	OFF	OK	✓
BOARD 14	OFF	OK	✓
BOARD 2	OFF	OK	✓
BOARD 3	OFF	OK	✓
BOARD 4	OFF	OK	✓
BOARD 5	OFF	OK	✓
BOARD 6	OFF	OK	✓
BOARD 7	ON	OK	✓
BOARD 8	OFF	OK	✓
BOARD 9	OFF	OK	✓
POWER SUPPLY 1	ON	OK	✓
POWER SUPPLY 2	UNHEALTHY	OK	✓
SHELF MANAGER 1	ON	OK	✓
SHELF MANAGER 2	STANDBY	OK	✓

ATLAS FSM integration

fwAtcaFsm Usage

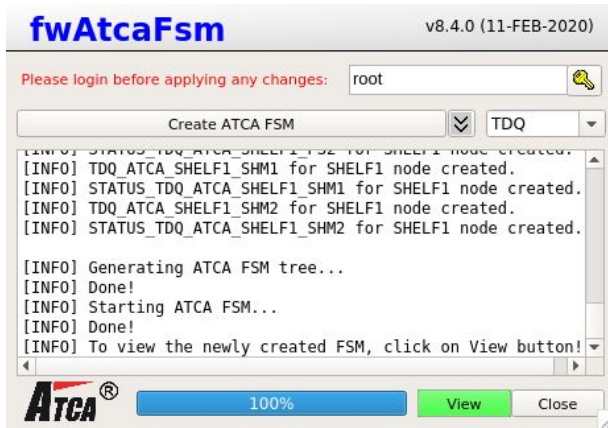
- Pleasant one-click operation
 - Literally <1 minute task



ATLAS FSM integration

fwAtcaFsm

- Pleasant one-click operation
 - Literally <1 minute task
 - Results to a **fully functional ATLAS FSM ATCA project (tree+UIs)**



ATCA

Device: **14U 14-Slot ATCA Shelf, ACB** **AdvancedTCA**
 Manufacturer: **Schroff** Present ●
 Chassis ID: **PM Chassis 2**
 Uptime: ● Connection State: ●

Slot	Device	Power	Hot Swap	Present	RTM	Power	Hot Swap
Slot 1	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 10	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 11	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 12	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 13	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 14	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 2	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 3	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 4	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF
Slot 5	N/A	OFF	OFF	ABSENT	OFF	OFF	OFF

Common

Sensor Name	Value
ATCR250 SE temp (C)	22.37
ATCR250 PR temp (C)	23.86
LM82A internal (C)	30.00
LM82A FPGA temp (C)	45.00
LM82B internal (C)	24.00
LM82B FPGA temp (C)	30.00
LM82 internal (C)	29.00
LM82 FPGA temp (C)	34.00
Internal temp. (C)	0.00
Internal temp. (C)	21.00
ATCR250 48V Volt (V)	53.34
ATCR250 48V Curr (A)	1.41

Fan tray info

Sensor Name	Value
Fan Tach 1 (rpm)	5520.0
Fan Tach 2 (rpm)	5460.0
Fan Tach 3 (rpm)	5460.0

DEV ATCA

ATCA SHELF 1	UNHEALTHY	OK	
BOARD 1	OFF	OK	✓
BOARD 10	OFF	OK	✓
BOARD 11	OFF	OK	✓
BOARD 12	OFF	OK	✓
BOARD 13	OFF	OK	✓
BOARD 14	OFF	OK	✓
BOARD 2	OFF	OK	✓
BOARD 3	OFF	OK	✓
BOARD 4	OFF	OK	✓
BOARD 5	OFF	OK	✓
BOARD 6	OFF	OK	✓
BOARD 7	ON	OK	✓
BOARD 8	OFF	OK	✓
BOARD 9	OFF	OK	✓
POWER SUPPLY 1	ON	OK	✓
POWER SUPPLY 2	UNHEALTHY	OK	✓
SHELF MANAGER 1	ON	OK	✓
SHELF MANAGER 2	STANDBY	OK	✓

ATLAS FSM integration

ATCA FSM API & accompanying functionality

- The fwAtcaFsm framework package exposes additionally an **ATCA FSM API** (WinCC OA library) with **functionality to handle the flow** of the procedure to create the tree
 - Sub-detectors developers can use this method to create custom scripts in order to **integrate and extend** with more complex solutions (integrate with information from other ATCA-related OPC UA servers)
- Comprises functionality for custom board information
 - Functionality that **binds external-source information to board node status**. The ATCA FSM API user provides relevant to blade datapoints in a sensitivity list which is taken into account for the calculation of the status of the node

```
fwAtcaFsm_addDpesToBoardStatus(string boardDp,  
                               dyn_string appendToSensitivitydpeList)
```

The screenshot displays the ATLAS FSM interface for a DEV ATCA device. The main window shows the status of ATCA Shelf 1, which is currently UNHEALTHY. Below this, a list of boards (BOARD 1 to BOARD 14) and components (POWER SUPPLY 1, POWER SUPPLY 2, SHELF MANAGER 1, SHELF MANAGER 2) are listed with their respective status indicators (OFF, ON, UNHEALTHY, OK, STANDBY) and checkmarks. The interface also shows a list of slots (Slot 1 to Slot 14) and their corresponding status indicators (OFF, ON, ABSENT, Present). On the right side, there are two data tables showing values for various components, such as Fan Tach 4 (rpm) and Fan Tach 5 (rpm).

Component	Status	Value
ATCA SHELF 1	UNHEALTHY	
BOARD 1	OFF	OK
BOARD 10	OFF	OK
BOARD 11	OFF	OK
BOARD 12	OFF	OK
BOARD 13	OFF	OK
BOARD 14	OFF	OK
BOARD 2	OFF	OK
BOARD 3	OFF	OK
BOARD 4	OFF	OK
BOARD 5	OFF	OK
BOARD 6	OFF	OK
BOARD 7	ON	OK
BOARD 8	OFF	OK
BOARD 9	OFF	OK
POWER SUPPLY 1	ON	OK
POWER SUPPLY 2	UNHEALTHY	OK
SHELF MANAGER 1	ON	OK
SHELF MANAGER 2	STANDBY	OK

Value
22.37
23.86
30.00
45.00
24.00
30.00
29.00
34.00
0.00
21.00
53.34
1.41

Value
5520.0
5460.0
5460.0
5460.0
5460.0
5460.0
5460.0
5460.0
5460.0
5460.0
5520.0

LAR ATCA integrated in ATLAS FSM

The screenshot displays the ATLAS FSM interface for a 14U ATCA shelf. The left sidebar shows a rack view with 14 slots, where Slot 7 is highlighted as 'UNHEALTHY'. The central panel, titled 'DEV ATCA SHELF1', provides a detailed view of the components in Slot 7, including a 'Shelf Manager A1' and 'PS:1'. The right panel contains several readouts for LAR Values (AMC 5-9) and Fan Tray information, showing temperature and power consumption data for various sensors and fan trays.

DEV ATCA SHELF1

14U 14-Slot ATCA Shelf, ACB Shelf I Conn. ● **AdvancedTCA**

Manu. **Schroff** Chassis **PM Chassis 2**

Slot	Device	Power	Health	RTM
Slot 1	N/A / N/A / N/A	OFF	Present	RTM
Slot 2	N/A / N/A / N/A	OFF	Present	RTM
Slot 3	N/A / N/A / N/A	OFF	Present	RTM
Slot 4	N/A / N/A / N/A	OFF	Present	RTM
Slot 5	N/A / N/A / N/A	OFF	Present	RTM
Slot 6	N/A / N/A / N/A	OFF	Present	RTM
Slot 7	CERN / Cirly/Adax / IPMC-TestPAD	ON	Healthy	RTM
Slot 8	N/A / N/A / N/A	OFF	Present	RTM
Slot 9	N/A / N/A / N/A	OFF	Present	RTM
Slot 10	N/A / N/A / N/A	OFF	Present	RTM
Slot 11	N/A / N/A / N/A	OFF	Present	RTM
Slot 12	N/A / N/A / N/A	OFF	Present	RTM
Slot 13	N/A / N/A / N/A	OFF	Present	RTM
Slot 14	N/A / N/A / N/A	OFF	Present	RTM

Shelf Manager A1 ● OFF N/A ● OFF

PS:1 ● Present ● Healthy

FT:1 Lv: 8 ● Present ● Healthy

FT:2 Lv: 8 ● Present ● Healthy

Common

Sensor Name	Value
ATCR250 SE temp	21.37
ATCR250 PR temp	23.86
LM82A Internal	29.00
LM82A FPGA temp	45.00
LM82B Internal	24.00
LM82B FPGA temp	30.00
LM82 Internal	29.00
LM82 FPGA temp	34.00
Internal temp	21.00
ATCR250 48V Volt	53.34
ATCR250 48V Curr	1.41
ATCR250 FA Volta	54.07
ATCR250 3.3V Vol	3.36
ATCR250 12V Volt	12.34
ATCR250 12V Curr	2.94
Local Temp	19.00
IMX VDD I1V35	1.37
DDR2 LV8 INPUT	1.73
3V3 local	3.39
I2C PWR A	3.68
I2C PWR B	3.68
5V0 local	5.05
PEM A Temp	23.00
+3.3V	3.33
+3.6V External	3.57
Temp Controller	20.00
Temp In Left	21.00
Temp In Center	20.00
Temp In Right	20.00
+3.3V	3.39
+3.6V External	3.61
Temp Controller	24.00
Temp Out Left	21.00
Temp Out Center	22.00

LAR Values AMC 5	LAR Values AMC 5	LAR Values AMC 5	LAR Values AMC 5
TEMP_FPGA 54.0 C	TEMP_FPGA 61.0 C	TEMP_FPGA 62.0 C	TEMP_FPGA 58.0 C
VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 5.2 A A10_VCC 15.4 A	VCC_GXB 1.0 V A10_VCC 0.9 V
VCC_GXB 4.8 A A10_VCC 12.8 A	VCC_GXB 0.2 V A10_VCC 0.2 V	VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 3.0 A A10_VCC 4.0 A
LAR Values AMC 6	LAR Values AMC 6	LAR Values AMC 6	LAR Values AMC 6
TEMP_FPGA 27.0 C	TEMP_FPGA 27.0 C	TEMP_FPGA 62.0 C	TEMP_FPGA 56.0 C
VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 0.2 V A10_VCC 0.2 A	VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 1.0 V A10_VCC 0.9 V
VCC_GXB 5.0 A A10_VCC 13.8 A	VCC_GXB 0.2 A A10_VCC 0.2 A	VCC_GXB 5.0 A A10_VCC 16.2 A	VCC_GXB 2.8 A A10_VCC 2.8 A
LAR Values AMC 7	LAR Values AMC 7	LAR Values AMC 7	LAR Values AMC 7
TEMP_FPGA 54.0 C	TEMP_FPGA 26.0 C	TEMP_FPGA 60.0 C	TEMP_FPGA 50.0 C
VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 0.2 V A10_VCC 0.2 V	VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 1.0 V A10_VCC 0.9 V
VCC_GXB 5.0 A A10_VCC 13.2 A	VCC_GXB 0.2 A A10_VCC 0.2 A	VCC_GXB 5.2 A A10_VCC 15.6 A	VCC_GXB 2.8 A A10_VCC 2.8 A
LAR Values AMC 8	LAR Values AMC 8	LAR Values AMC 8	LAR Values AMC 8
TEMP_FPGA 50.0 C	TEMP_FPGA 51.0 C	TEMP_FPGA 51.0 C	TEMP_FPGA 43.0 C
VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 1.0 V A10_VCC 0.9 V	VCC_GXB 1.0 V A10_VCC 0.9 V
VCC_GXB 5.0 A A10_VCC 14.2 A	VCC_GXB 5.0 A A10_VCC 14.0 A	VCC_GXB 5.0 A A10_VCC 14.0 A	VCC_GXB 2.6 A A10_VCC 2.2 A
LAR Values Slot 3	LAR Values Slot 4	LAR Values Slot 9	LAR Values Slot 6
TMP100 26.0 C FFGA 41.0 C	TMP100 22.0 C FFGA 38.0 C	TMP100 27.0 C FFGA 42.0 C	TMP100 32.0 C FFGA 49.0 C
+12V 12.0 V +12V 16.0 A	+12V 11.9 V +12V 3.2 A	+12V 12.0 V +12V 17.0 A	+12V 12.0 V +12V 10.4 A
AMC1 11.9 V AMC1 3.5 A	AMC1 0.0 V AMC1 0.0 A	AMC1 12.0 V AMC1 3.9 A	AMC1 11.9 V AMC1 2.3 A
AMC2 11.9 V AMC2 3.8 A	AMC2 0.2 V AMC2 0.0 A	AMC2 11.9 V AMC2 4.0 A	AMC2 11.9 V AMC2 2.1 A
AMC3 11.9 V AMC3 3.5 A	AMC3 11.9 V AMC3 3.8 A	AMC3 11.9 V AMC3 3.8 A	AMC3 11.9 V AMC3 2.0 A
AMC4 11.9 V AMC4 3.4 A	AMC4 0.0 V AMC4 0.0 A	AMC4 11.9 V AMC4 3.8 A	AMC4 11.9 V AMC4 1.8 A

Fan tray info

Sensor Name	Value
Fan Tach 1	5400
Fan Tach 2	5460
Fan Tach 3	5460
Fan Tach 4	5460
Fan Tach 5	5460
Fan Tach 6	5460
Fan Tach 2	5460
Fan Tach 3	5460
Fan Tach 4	5400
Fan Tach 5	5400
Fan Tach 6	5460
Fan Tach 1	5460

FanTraysDro = 02

Lower Fan Tray ● 9.0 Level

Left ● 27.0 C Center ● 27.0 C Right ● 27.0 C

Upper Fan Tray ● 9.0 Level

Left ● 28.0 C Center ● 29.0 C Right ● 27.0 C

LAR panel from S. Chekulaev

STF L1Calo ATCA integrated in ATLAS FSM

Example in L1Calo, left fwAtcaFsm, right custom path for additional board information

DEV ATCA SHELF1

14U 14-Slot ATCA Shelf, ACB Shelf I Conn. **AdvancedTCA**

Manu. Schroff Chassis PM Chassis 2

Board	Status	Health
BOARD 1	OFF	OK
BOARD 10	OFF	OK
BOARD 11	OFF	OK
BOARD 12	OFF	OK
BOARD 13	OFF	OK
BOARD 14	OFF	OK
BOARD 2	OFF	OK
BOARD 3	OFF	OK
BOARD 4	OFF	OK
BOARD 5	OFF	OK
BOARD 6	OFF	OK
BOARD 7	ON	OK
BOARD 8	ON	OK
BOARD 9	ON	OK
POWER SUPPLY 1	ON	OK
POWER SUPPLY 2	UNHEALTHY	OK
SHELF MANAGER 1	ON	OK
SHELF MANAGER 2	STANDBY	OK

Sensor Name	Value	Type
ATCR250 SE temp	21.37	Temperature
ATCR250 PR temp	23.86	Temperature
LM82A Internal	29.00	Temperature
LM82A FPGA temp	45.00	Temperature
LM82B Internal	24.00	Temperature
LM82B FPGA temp	30.00	Temperature
LM82 Internal	29.00	Temperature
LM82 FPGA temp	34.00	Temperature
Internal temp.	21.00	Temperature
ATCR250 48V Volt	53.34	Temperature
ATCR250 48V Curr	1.41	Temperature
ATCR250 FA Volta	54.07	Temperature
ATCR250 3.3V Vol	3.36	Temperature
ATCR250 12V Volt	12.34	Temperature
ATCR250 12V Curr	2.94	Temperature
Local Temp	19.00	Temperature
IMX VDD 1V35	1.37	Temperature
DDR2 1V8 INPUT	1.73	Temperature
3V3 local	3.39	Temperature
I2C PWR A	3.68	Temperature
I2C PWR B	3.68	Temperature
5V0 local	5.05	Temperature
PEM A Temp	23.00	Temperature
+3.3V	3.33	Temperature
+3.6V External	3.57	Temperature
Temp Controller	20.00	Temperature
Temp In Left	21.00	Temperature
Temp In Center	20.00	Temperature
Temp In Right	20.00	Temperature
+3.3V	3.39	Temperature
+3.6V External	3.61	Temperature
Temp Controller	24.00	Temperature
Temp Out Left	21.00	Temperature
Temp Out Center	22.00	Temperature

Sensor Name	Value
Fan Tach 1	
Fan Tach 2	
Fan Tach 3	
Fan Tach 4	
Fan Tach 5	
Fan Tach 6	
Fan Tach 2	
Fan Tach 3	
Fan Tach 4	
Fan Tach 5	
Fan Tach 6	
Fan Tach 1	

L1Calo Module

Node Information

- Power On:
- AtcaServer:
- IpBusServer:

Crate ID: 0 Node ID: 5

Board Type: FTM Other Info:

Reading Display: CR25012C SET

Channel: 1 ATCR25012C 2.4

Fault Information

Fault:

Fault Type:

Channel:

Value:

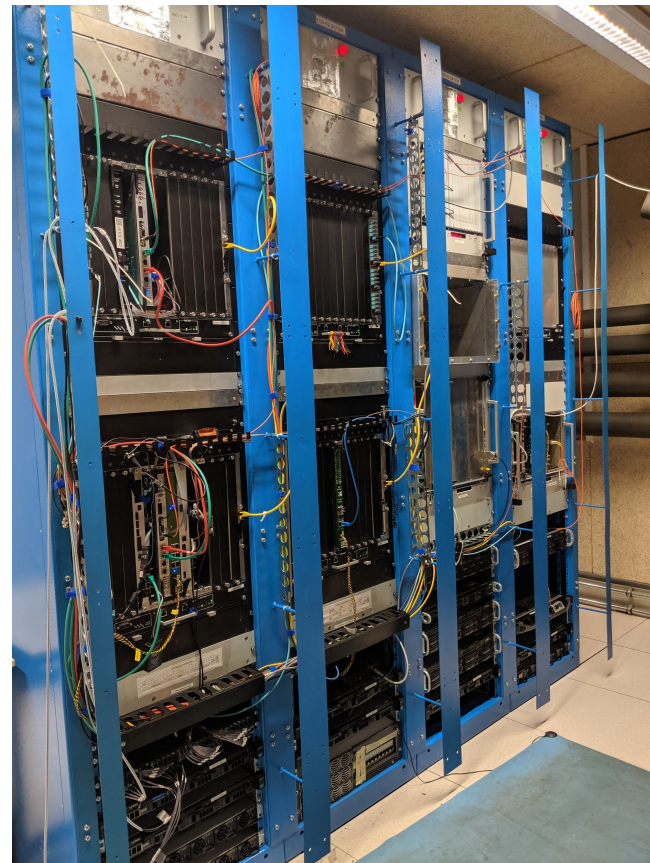
Channel	Name	Value	Low Fatal	Low Error	Low Warning	High Warning	High Error	High Fatal	Units
135	ds2T3F0	0.75	0.00	-11.30	0.00	0.00	2.40	3.00	W
136	ds2T3P1	0.83	0.00	-11.30	0.00	0.00	2.40	3.00	W
137	ds2T3P10	0.82	0.00	-11.30	0.00	0.00	2.40	3.00	W
138	ds2T3P11	0.81	0.00	-11.30	0.00	0.00	2.40	3.00	W
139	ds2T3P2	0.91	0.00	-11.30	0.00	0.00	2.40	3.00	W
140	ds2T3P3	0.87	0.00	-11.30	0.00	0.00	2.40	3.00	W
141	ds2T3P4	0.99	0.00	-11.30	0.00	0.00	2.40	3.00	W
142	ds2T3P5	0.82	0.00	-11.30	0.00	0.00	2.40	3.00	W
143	ds2T3P6	0.95	0.00	-11.30	0.00	0.00	2.40	3.00	W
144	ds2T3P7	0.92	0.00	-11.30	0.00	0.00	2.40	3.00	W
145	ds2T3P8	0.93	0.00	-11.30	0.00	0.00	2.40	3.00	W
146	ds2T3P9	0.89	0.00	-11.30	0.00	0.00	2.40	3.00	W
147	ds2T3T	37.00	0.00	0.00	0.00	65.00	75.00	85.00	C
148	ds2V	0.99	0.95	0.97	0.00	0.00	1.03	1.05	V

Use cases and applications

Current AtcaOpcUa Use Cases in ATLAS

	ATCA Shelves	OPC UA ATCA Servers	fwAtca	fwAtcaFsm	Status
LAr	3	2	✓	✓	In P1 and in EMF test setup
TDAQ	6	1	✓	✓	In STF development machine
CSC	1	1			In development machine
NSW	4	3	✓	✓	In integration sites and in development setup

Big effort with sub-detectors to facilitate deployment in their test setups. Thanks to P. Thompson and TDAQ team for providing their hardware



Picture from Surface Test Facility pre-Covid

Final Points

- The ATCA software ecosystem has made progress and fulfilled the required functionality
- An automatic discovery mechanism was introduced, covering standard and custom variables and sensors
- The performance has been improved taking into account users DCS-needs
- A set of tools for easy integration in WinCC OA complementing the controls ecosystem
 - Including archiving and alarm handling
- An extra set of tools for easy integration in ATLAS FSM has been introduced
 - One-click from datapoints to tree
- The software gained mileage in various sub-detectors ATCA setups including 2 LAr ATCA in P1

Thank you!

AtcaOpcUa server and WinCC OA integration references

- General interest group for OPC UA (releases, news, feedback etc)
 - opc-ua-atca
- Main project page
 - <https://gitlab.cern.ch/atlas-dcs-opcua-servers/AtcaOpcUa/-/releases>
 - Suggested v. 0.9.1
- fwAtca - WinCC OA integration for AtcaOpcUa
 - <https://gitlab.cern.ch/atlas-dcs-fwcomponents/fwAtca>
 - Suggested v. 8.4.2
- fwAtcaFsm - ATLAS FSM integration
 - <https://gitlab.cern.ch/atlas-dcs-fwcomponents/fwAtcaFsm>
 - Suggested v. 8.4.2

Thank you!

Backup