

# **The EPICS Data Diode**

G.Ferro

F.Sartori, N.Cruz, J.Antti, A.Duarte

# Remote participation NOT Remote Control



To minimize the risks in large experimental facilities, high level of coordination is needed.

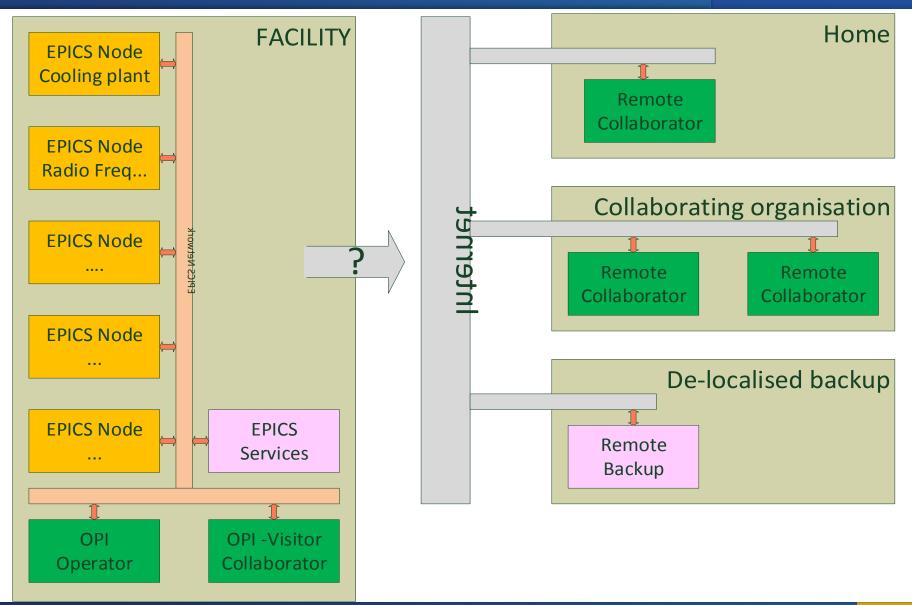
Main coordination center = CONTROL ROOM

# **REQUIREMENTS:**

- Stringent rules for allowing external connections to the facility.
- Remote operation not allowed.
- To allow remote monitoring, traffic must be one-directional to the external server(s).

# **Current State and needs**





# The DIODE



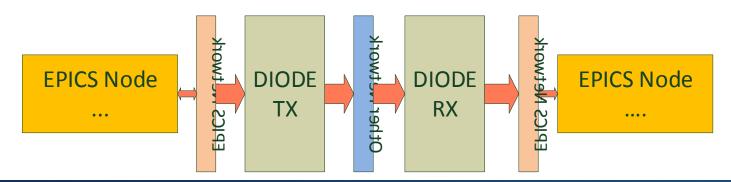
### **Objectives:**

A mean to send the data out efficiently

### **Implements:**

- One-way gateway between two networks via a third one (for instance internet)
- Cannot be configured to let data in the opposite direction
  Requires:
- Minimum network security compromise: only ability to connect to external server (like a Browser)

Currently uses HTTP so that we can go through proxies. Multiple parallel connections to handle network latencies.



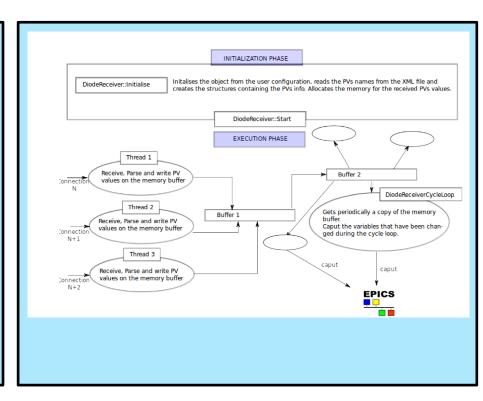
# The DIODE



# **Diode Sender**

#### INITIALIZATION PHASE EpicsParserAndSubscriber::Initialise(\*) Configure the EpicsParserAndSubscriber object Configure the PrioritySender object PrioritySender::Initialise(\*) Reads the PVs names and launches a thread to create the subscriptions EpicsParserAndSubscriber::ParseAndSubscribe(\*) PrioritySender::GetDataSource(\*) The PrioritySender gets a pointer to the EpicsParserAndSubscriber PrioritySender::Start() GetValueCallback EXECUTION PHASE Thread 1 Copies the PVs value into internal Connection N Build the HTTP message memory when the it changes Synchronise() Connection N+1 PrioritySenderCycleLoop Build the HTTP message Calls Synchronise() to get the PVs Sorts the list to push the changed Thread 3 PVs to the first position of the queue Connection N+2 Build the HTTP message Triggers the threads then waits for the next cycle

## **Diode Receiver**



- Configurable number of connections.
- Configurable send rate, the PVs changed during the period are sent first.
- Configurable caput rate on the receiver. The PV timestamp is preserved.

The EPICS Data Diode

# **CONCLUSIONS**



- The Diode provides an immediate and safe solution to monitor machine operations remotely.
- The use of the MARTe2 lib for its implementation makes it easy to configure and adaptable for different use cases (push the PVs to serial, to reflective memory, etc.)
- It is suitable for long-distance communication as well as for local ones (i.e technical to office network).
- Currently it reads/writes to EPICS through the channel access and uses softIOCs to replicate the sender EPICS environment on the receiver.
- The first version is already being employed. Currently it is passing through the QA process, to find out what can be improved.