GIF++ User DCS Overview

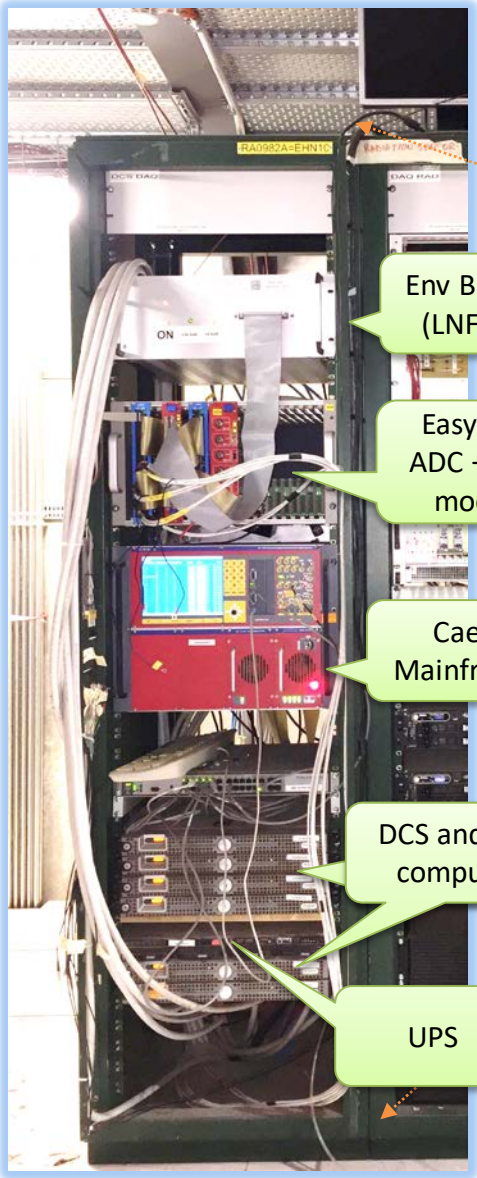
A. Polini, M. Romano
INFN Bologna

GIF++ Annual User Meeting
December 1st 2022

Outline:

- Reminder of the GIF++ User Detector Control System
- Status Update and Plans

Setup Reminder



Location: 0887 R-8007
Zone: EHN1-RA0982A

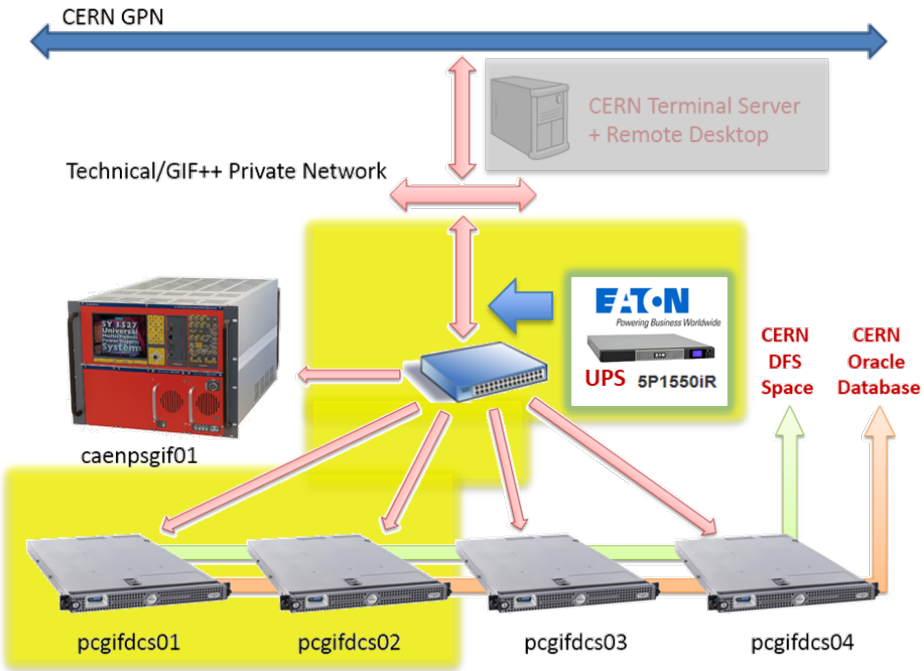
Power System (present configuration):

- 1 SY-1527 CAEN Mainframe with several HV and LV boards
  - Slot 0: Mod. A1676 CAEN Branch Controller
  - Slot 1: Mod. A1526 6 Ch Pos. 15KV 1mA x
  - Slot 9: Mod. A1526 6 Ch Pos 15 KV 1mA
  - Slot 11: Mod A153GD 12Ch Neg 3.5 kV 3mA
  - Slot 13: Mod. A1526 6 Ch Neg. 15KV 1mA
- 1 Easy 3000 crate with 1
  - 128-ch ADC (A-3801)
    - for readout of Environmental sensors and detector currents
  - RPC ATLAS Phase 1 Test HV Board A3512AP mod

Computing Infrastructure:

- 1 Network switch dedicated network switch (GIF++ and managed CERN-IT)
  - Replaced in Jan 2022 after stopping working following some AUG tests
- Several DELL Rack mounted computers (mainly DELL 1950)
  - 1 production Windows Server main WinCC project
  - 1 spare shadow machine
- 2 Windows additional machines for individual development
- 2 DAQ machines (Linux) for R&D

User DCS Network Reminder



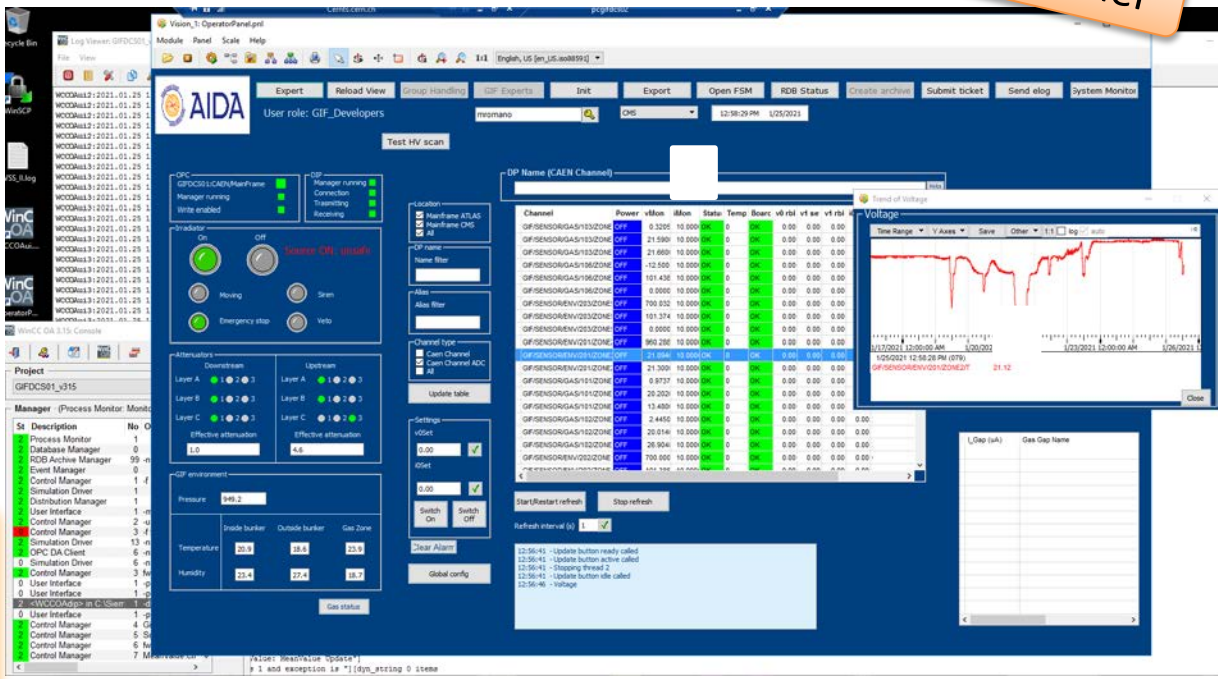
Network:

- CERN Supported Network Switch with private subnet.
- All machines added to a CERN Network Set (GIF DCS CONTROL SET),
  - GIFPP BYPASS LIST, GIFPP DAQ AND DCS EXPOSED TO GPN created
- Gateway still kept open, Connect via remote desktop to any of the 4 computers, Shifters, Users, Experts defined by e-groups
- Software on DFS and data of Main USER-DCS WinCC project archived on Oracle (full history always accessible).
- **Uninterruptible Power Supply** for critical systems (Network switch, DCS PCs dcs01 + dcs02 + …)

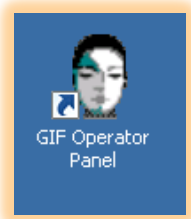
User DCS Software

Reminder

- UserDCS project (WinCC-OA based) running on the **pcgifdcs02.cern.ch**
- Work in progress: interface accessible from pcgifdcs03/04 machines via the "GIF Operator Panel" desktop icon



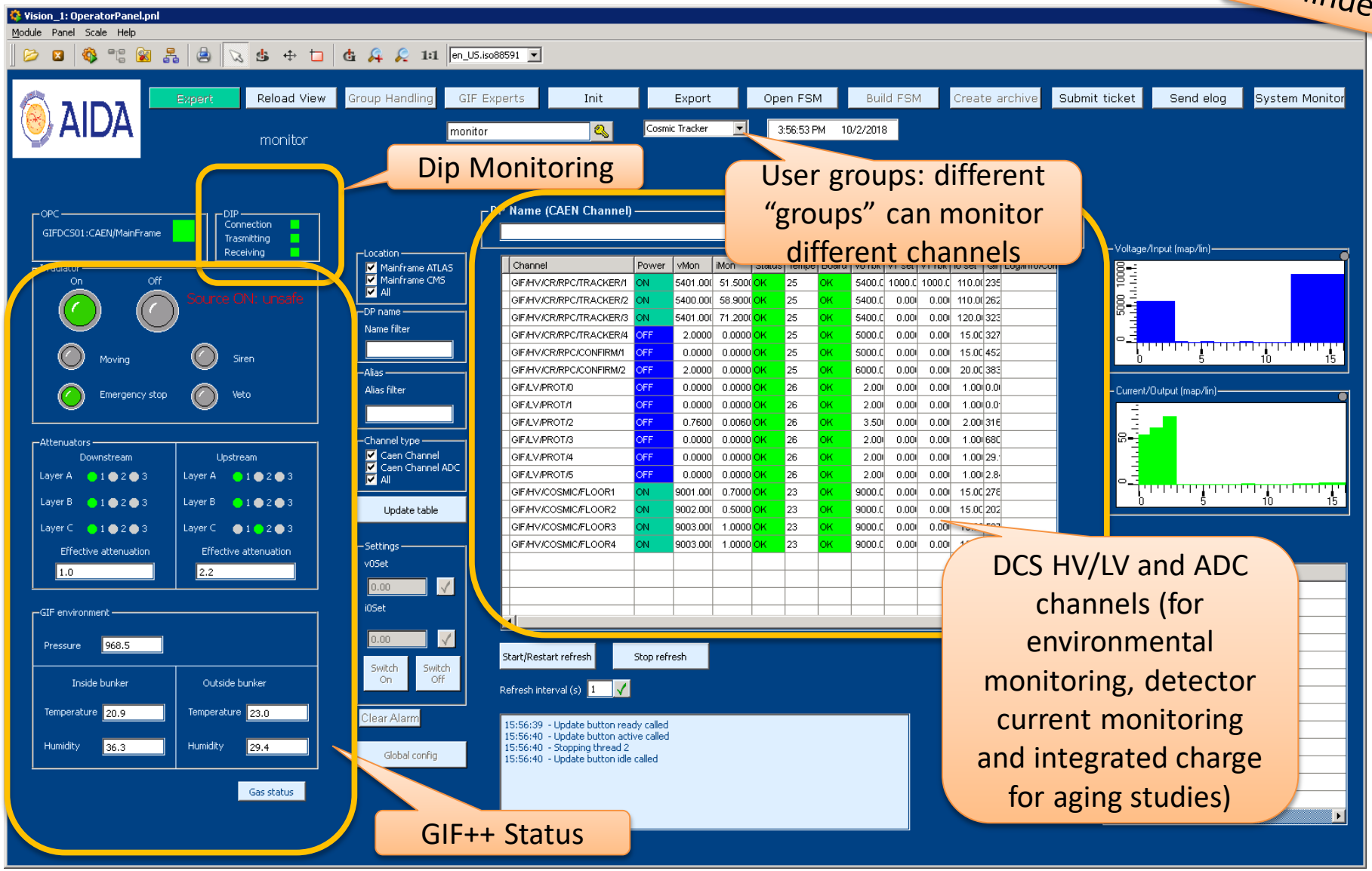
- Machine Allocation:
  - **dcs01 backup**
  - **dcs02 main machine**
  - dcs03 other users
  - dcs04 CMS RPC
  - Roles for dcs03/04 to be reviewed



  - Scripts and panel saved on a dedicated DFS space
  - Any other machine with a working installation of WinCC-OA **3.15** and read/write access to the DFS folder \cern.ch\dfs\Projects\GIF\DCS\GIF++UserDCS can setup a GUI connection Operator panel GUI allows access to most of the DCS features
- Communication with the Mainframe via the OPC protocol
- Information from GIF central DCS accessed via DIP
- All relevant information archived in a CERN Oracle DB
- CERN-based access control (e-groups) with different level of privileges

The GUI: The Operator Panel

Reminder

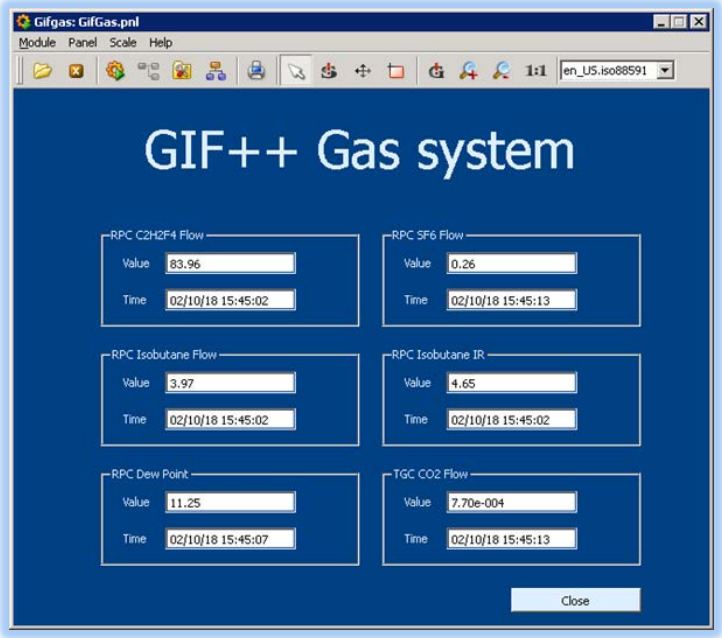


Information and Features (i)

Reminder

Available Information to and from DCS:

- **Info read from the Mainframe via OPC:**
  - All archived on Oracle DB
  - 128-channels ADC board:
    - Currents from CMS RPC chambers (GIF/CURRENT/CMSRPC/XX)
    - P/T/RH from env sensors (GIF/SENSOR/ENV/XXX/ZONEY/P,T,RH)
    - P/T/RH from gas sensors (GIF/SENSOR/GAS/XXX/ZONEY/P,T,RH)
  - 2 HV boards (ATLAS RPC and COSMIC tracker)
  - Charge integration (μC) for the currents read by 1) the HV CAEN channels 2) the ADC connected directly to the chambers:
    - Integration of the current read by the HV CAEN channels is not reliable due to the non-zero current produced during the ramp-up process
- **Info read from DIP:**
  - Source/Attenuators status
  - Inside/outside bunker environment (P/T/RH)
  - Gas mixer info
- **Info published on DIP:**
  - P/T/RH from env sensors (dip/GIFpp/EnvSensors/XXX/ZONEY)
  - P/T/RH from gas sensors (dip/GIFpp/GasSensors/XXX/ZONEY)
- Values archived on CERN-Oracle and trends accessible by right clicking on the values

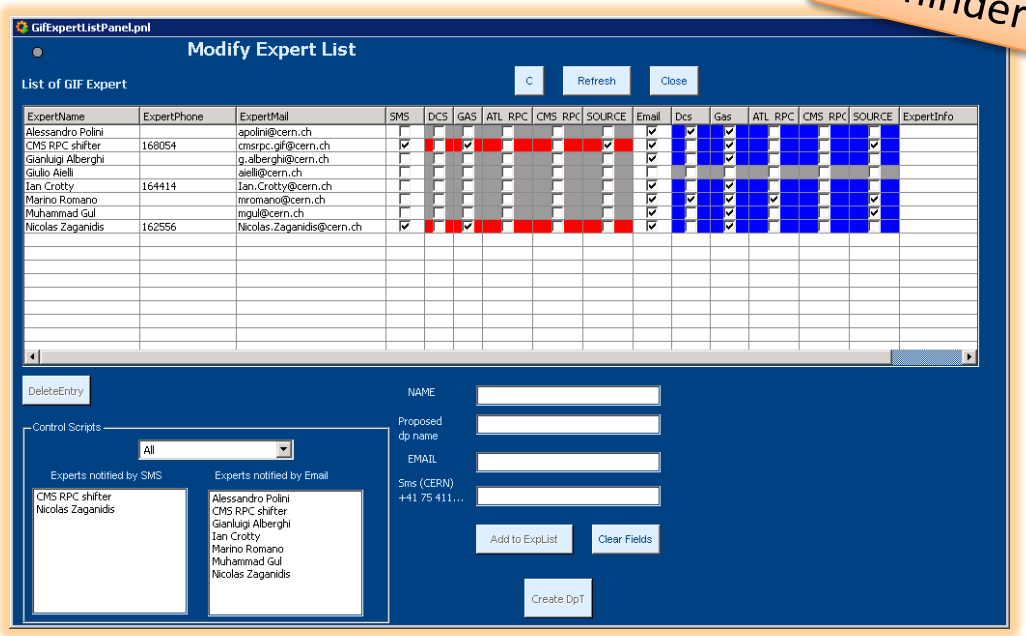


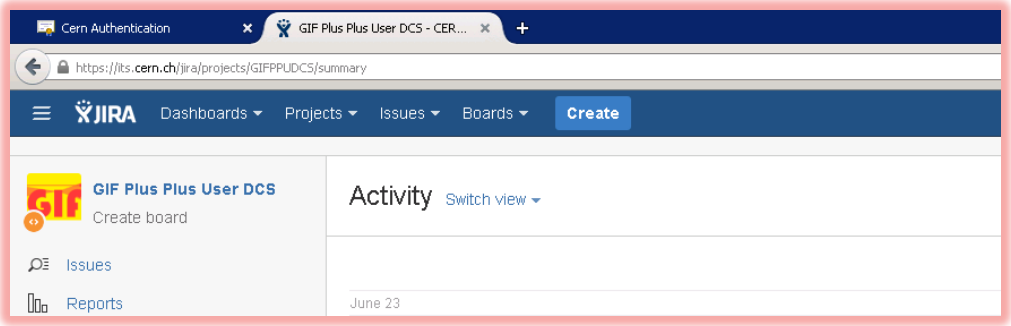
Information and Features (ii)

Reminder

Some Additional Features:

- Mail and SMS alerts: users can subscribe to alerts regarding the source, gas and general DCS status
- "Submit ticket" button to open a ticket on the dedicated JIRA project
- Possibility to dump, on-demand, the values of the archived values at any date
- Channel list of individual experimental setups can be modified on the fly via a dedicated GUI
- "Send elog" button allows to directly post an entry to the GIFelog
- Possibility of scheduling and performing DCS automated tests if conditions are fulfilled
  - Example from the past (ATLAS RPC):
    - Every morning (with source ON): bring the channels at half nominal voltage, wait 30min and ramp them up
    - Every Wednesday evening (with source OFF): switch off the channels, ramp them back up in 25 steps, waiting 5mins between steps. Save voltages and current on file





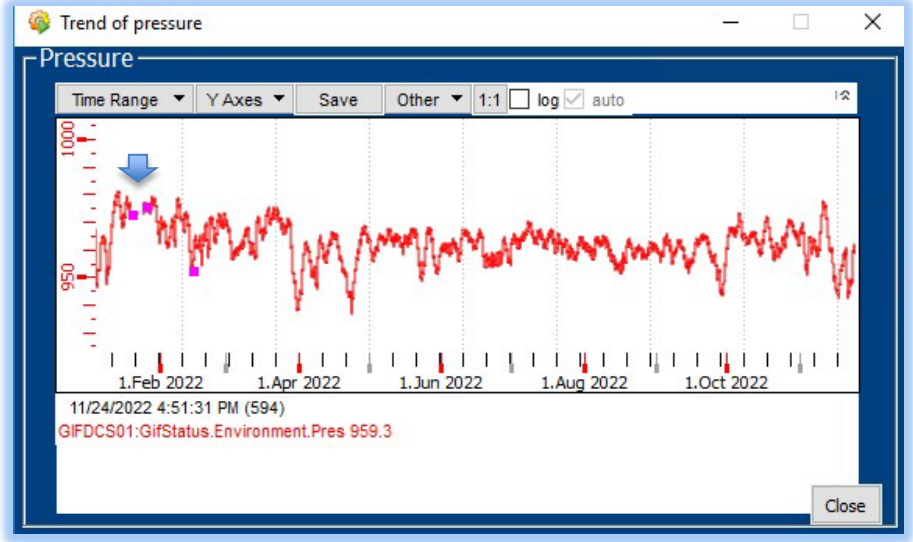
Maintenance and Interventions

- System running 24/7 and allowing for:
  - Control and monitor of HV and LV channels for detectors
  - ADC channel for monitoring of Gas and environmental quantities, detector currents, and on user request
  - Monitor and publish Pass GIF++ information through DIP etc.
  - Graphic User Interface for control and monitor
  - Possibility of automatic messages (for alarms/errors) and of automatic procedures/scanning sequences.
- System kept alive with minimal person-power:
  - (A. Polini, M. Romano, INFN Bologna) acting mostly on request.
  - Improvement in stability after inclusion of UPS (in 2019). We had no WinCC database corruptions in the last 24+ months.
  - Few manual RESETs to CAEN HW needed after power cut
    - CAEN Mainframe <u>is not</u> connected to the UPS

Maintenance and Interventions

- DCS system almost always online during last year

Availability of the OPC connection to the CAEN mainframe



Availability of the DIP connection to the central GIF DCS

System very stable: Very few "glitches" and disconnections observed in both systems → related to general power cuts in the facility

Jan 19th 2022: AUG test + broken Network switch failing, quickly replaced by CERN IT

CAEN PS down 6-12 May 2022 after a power cut

Status and Plans

Status:

- GIF++ User-DCS running stably despite low resources and low manpower
- Key aspect for improvements are feedback and requests from user group
- System is remotely monitored and can be remotely shutdown/restarted
- UPS installed in 2019 added further stability and avoided disruptions
- HW so far stable but mostly obsolete and from CERN–recuperation.
- Small developments:
  - DCS project fully migrated to WinCC 3.15 and Windows Server 2016 (on main project and 2 systems)
  - Up-to-date project running on PCGIFDCS02
  - Backup project (3.11) still available on PCGIFDCS01 (Older versions no longer supported by CERN IT)
  - Replaced network switch

Plans:

- Upgrade **all machines** to latest SCADA (WinCC 3.15, 3.16 etc.) and Windows versions
  - Rolling replacement with "Newer" but still decommissioned hardware
- On the long run, improve GUI and user accessibility (terminal server) if needed by Users
- Continue the support on best effort (➔ contacts and documentation in backup):
  - Alessandro, Marino
  - Listen to requests from Users

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Thank You!

backup

Contacts, information and links:

- Info and queries on GIF++ user DCS:
  ➔ M. Romano, A. Polini

- Some information on DCS architecture, machine names, projects, mapping of environmental information and services available on these twiki:
- https://twiki.cern.ch/twiki/bin/view/Atlas/AtlasRpcGif (currently available only for ATLAS users)
- https://twiki.cern.ch/twiki/pub/CMSPublic/GifSensors/AccesstoGIFuserDCSMarino-2.pptx additional instructions
- Issues and updates on dedicated JIRA project (preferential way to submit requests): https://its.cern.ch/jira/projects/GIFPPUDCS
- SVN repository: svn+ssh://svn.cern.ch/reps/atlasusr/mromano/GIF++UserDCS/trunk
- Mapping of the 6 gas sensors and 4 env sensors: https://twiki.cern.ch/twiki/bin/view/CMSPublic/GifSensors