Development of Standard MicroTCA Deployment at ESS

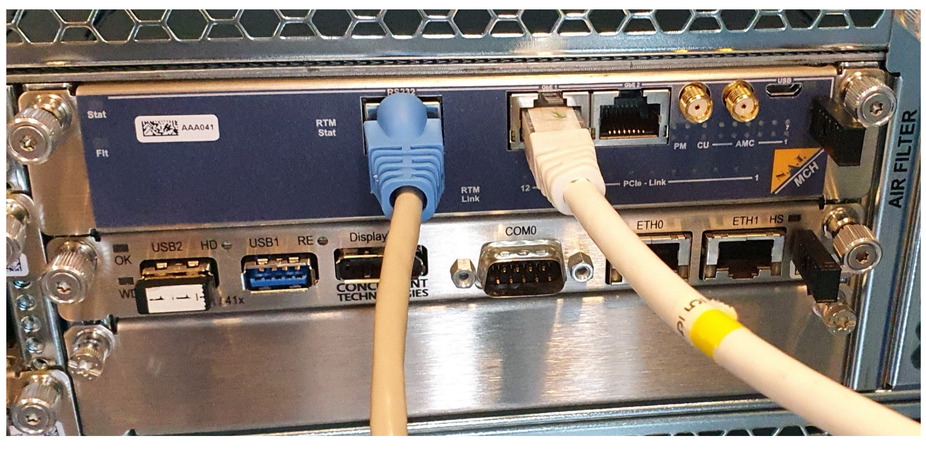
F. Chicken, J.J. Jamroz, J.P.S. Martins
European Spallation Source ERIC, Sweden

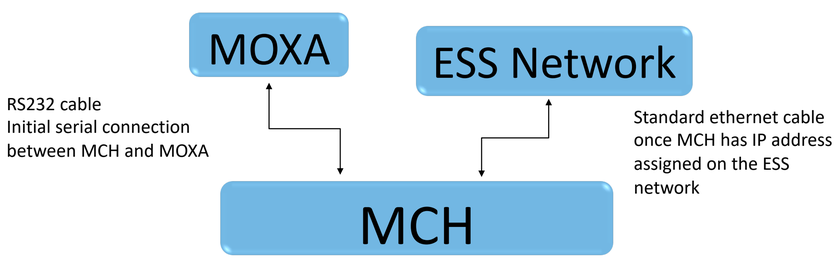
Abstract

Over 300 MTCA crates will be deployed at the European Spallation Source ERIC, upon the completion of the facility, spanning from the Ion Source to the Instrument Halls as part of the control systems for RF, Beam Instrumentation, Machine Protection and Timing Distribution. As the integration paths for these systems have matured, the deployment methods have needed to as well. The drive to have a standardised deployment methods for the Micro-Carrier Hub (MCH) and the CPU has been both to ensure easier maintainability of the systems in case of failures but also for upgrades and other changes. It also improves the handover from assembly to the stakeholder ready for integration with their devices.

MicroTCA Carrier Hub (MCH) Deployment

The MTCA Carrier Hub used at ESS is the NAT-MCH-PHYS board.





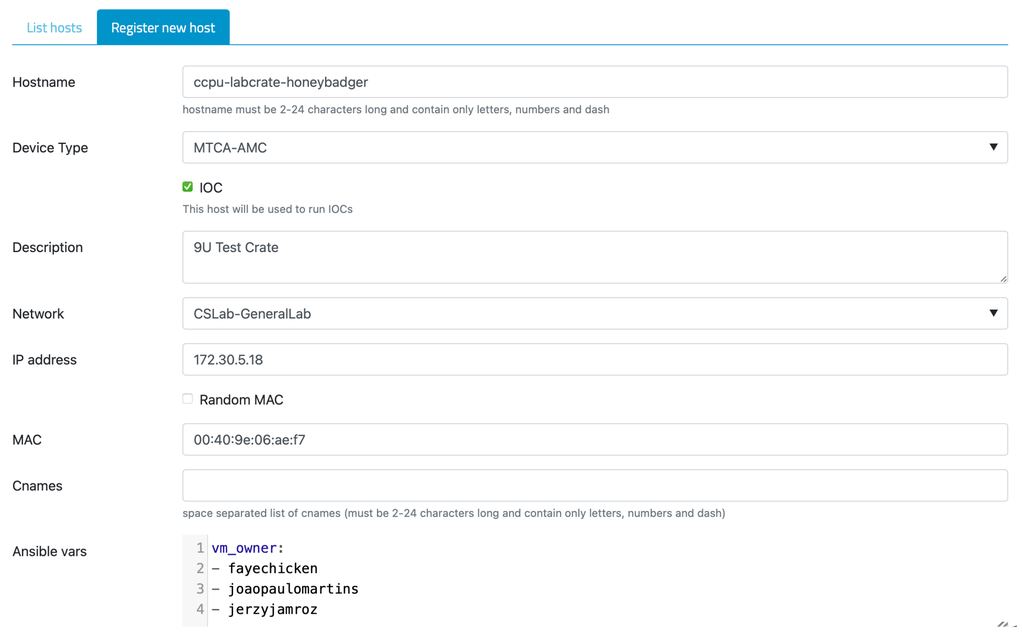
Initial configuration is done via RS232 through MOXA server, to allow a serial connection between the unconfigured MCH and the ESS network. Next step is the registration of the MCH on the ESS network, which is done in a custom in-house configuration management tool (CSEntry) REST API.

Standard settings and MCH firmware upgrades are applied, everything is automated using Gitlab-CI or done manually via Python scripts.

```
Running with gitlab-runner 15.10.0 (456e3482)
  on fat WBy1vi_Y, system ID: s_0c4c9508ef21
Resolving secrets                                   00:00
Preparing the "shell" executor                      00:00
Using Shell (bash) executor...
Preparing environment                               00:00
Running on cslab-wp4-workstation.cslab.esss.lu.se...
Getting source from Git repository                  00:01
Fetching changes with git depth set to 50...
Reinitialized existing Git repository in /var/lib/gitlab-runner/builds/WBy1vi_Y/0/hwcore/mtca/mch/.git/
Checking out 6ef772e5 as detached HEAD (ref is main)...
Removing __pycache__/
Removing logs/log_20230927_101454
Removing plugs/__pycache__/
Skipping Git submodules setup
Executing "step_script" stage of the job script
$ echo "/usr/bin/python3 mch.py --token *** $PARAMS"
/usr/bin/python3 mch.py --token *** --moxa_ip 172.30.5.36 --moxa_port 3 --mch_backplane 3 --update_fw 2.22.3 --configure_mch --reg_csentry
$ /usr/bin/python3 mch.py --token $CSEntryToken $PARAMS
2023-09-27 10:18:52,724 INFO mch.py:127 Log file: ./logs/log_20230927_101852
2023-09-27 10:18:52,724 INFO mch.py:135 Working on MCH
2023-09-27 10:18:52,724 INFO mchlib.py:73 Attempting to connect to the MCH using the MOXA backend
2023-09-27 10:18:52,724 INFO nat_mch.py:125 GenDev::Constructor - A new device has been registered
Device model: MCH
2023-09-27 10:18:52,724 INFO nat_mch_telnet.py:130 NATMCHTelnet - NAT MCH Telnet instance created.
MCH IP Address:
2023-09-27 10:19:08,790 INFO nat_mch.py:245
```

MicroTCA CPU Deployment

ESS is using CPUs made by Concurrent Technologies.



MTCA CPU gets updated BIOS configuration to allow for PXE Boot over network. Host is then registered in CSentry and set with the list of users with administrative level.
The Linux OS is installed using network boot installer.
Post-install job in Ansible installs ESS EPICS Environment and all the standard libraries and kernel drivers.

```
run-post-install-configuration   Plays 10  Tasks 142  Hosts 1  Elapsed 00:02:17

Identity added: /tmp/awx_414100_26mdr46s/artifacts/414100/ssh_key_data (/tmp/awx_414100_26mdr46s/artifacts/414100/ssh_key_data)
Vault password:

PLAY [all] ********************************************************************* 12:28:00

TASK [Gathering Facts] ********************************************************* 12:28:00
ok: [ccpu-38533-045.cslab.esss.lu.se]

PLAY [all] ********************************************************************* 12:28:02

TASK [ics-ans-role-dns-client : Configure /etc/resolv.conf] ******************** 12:28:02
changed: [ccpu-38533-045.cslab.esss.lu.se]

TASK [ics-ans-role-dns-client : Remove DNS entries from centos ifcfg files] **** 12:28:04
included: /tmp/awx_414100_26mdr46s/requirements_roles/ics-ans-role-dns-client/tasks/centos.yml for ccpu-38533-045.cslab.esss.lu.se

TASK [ics-ans-role-dns-client : Find files that contains the DNS and SEARCH options in /etc/sysconfig/network-scripts] *** 12:28:04
```


faye.chicken@ess.eu