

# Hardware Management for Liquid Cooling

Overview of Progress

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# HMLC - Overview

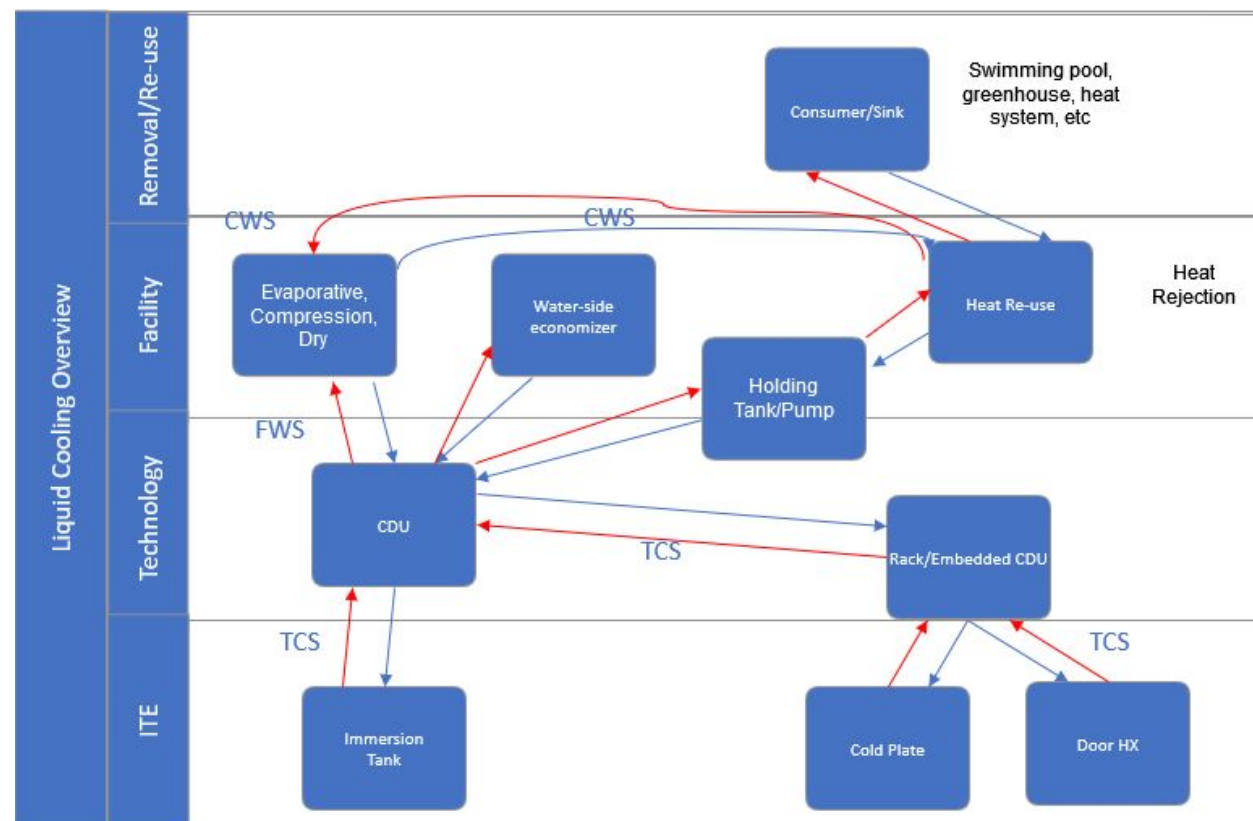
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# HMLC - Scope

- Kicked off April 6<sup>th</sup>, 2022
- Creation of a template and schema which supports all liquid cooling environments within OCP
- Interface with Redfish DCIM taskforce and DMTF
- Harmonize current requirements, whitepapers, specs and other documentation with work done in DMTF Thermal and Power management project
- 6 months for initial deliverables
- Longer period for whitepaper content and descriptive deliverables;
- On-going (low intensity) content maintenance

# HMLC – What to manage?

- Illustrative diagram of Liquid Cooling High Level topology
- Does not illustrate all possible scenarios or interconnections

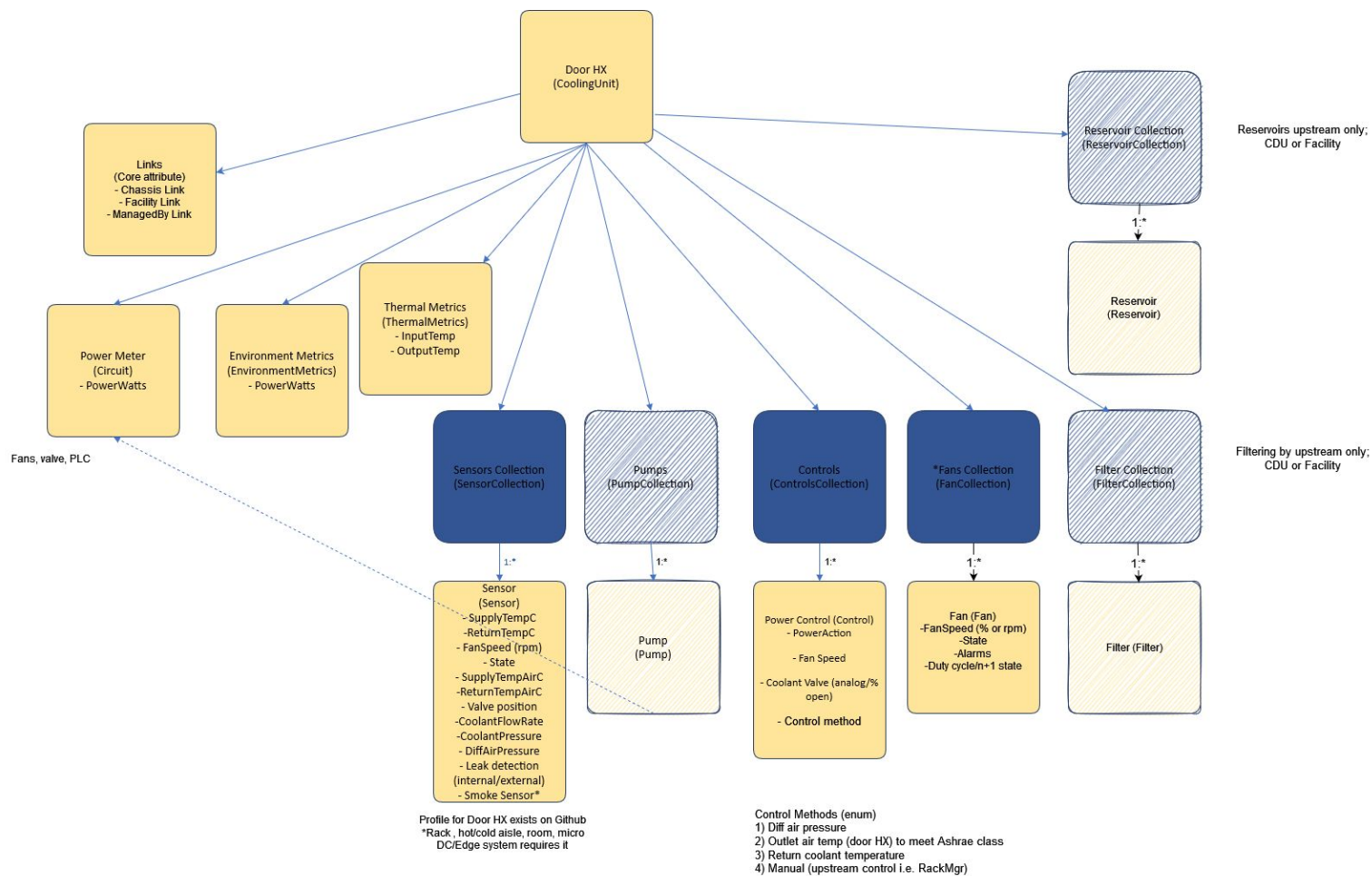


# HMLC - Progress

- Full schema for all/any liquid cooling technology;
  - Immersion – Draft released Dec 2021
  - Door HX – In progress
  - Cold Plate – In progress
  - ACF – Pending
  - Heat Re-use - Pending
- Message Registries; Events and Alarms - Pending
- OCP Profile(s) - Pending
- Requirements for qualification - Pending
- Security requirements - Pending



# HMLC – Door Heat Exchanger



- Door HX mapped to Redfish DCIM WIP schema for Thermal
- Abridged - does not show upstream resources or resource connections

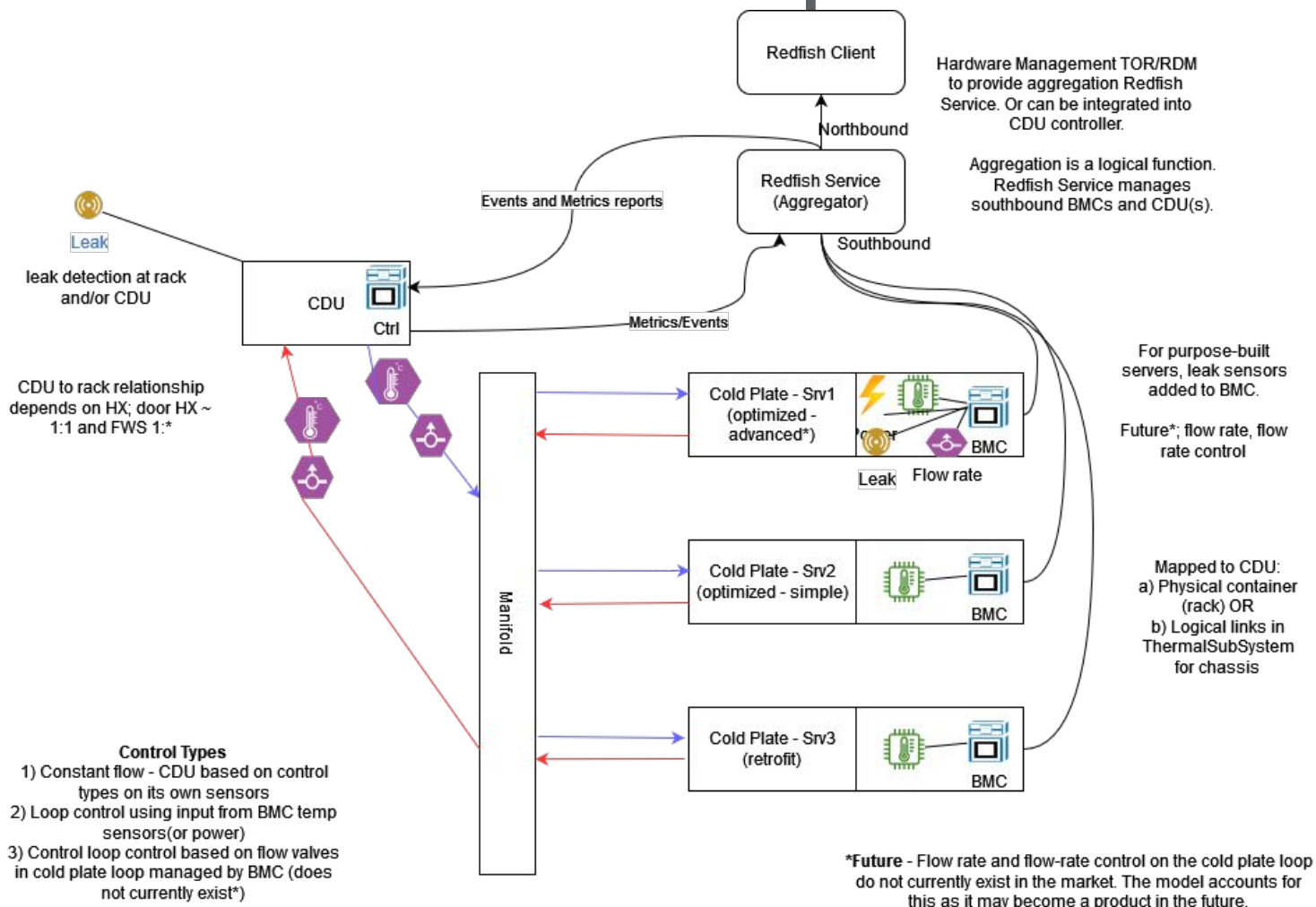
## Legend

- A singleton resource
- A collection of resources
- A resource present in schema, but not relevant to Door HX

[https://drive.google.com/file/d/16IUmw\\_hg0sMI3Br1QCwRet5wDjCcGLhYP/view?usp=sharing](https://drive.google.com/file/d/16IUmw_hg0sMI3Br1QCwRet5wDjCcGLhYP/view?usp=sharing)

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# HMLC – Cold plate



- Cold plate mapped to Redfish DCIM WIP schema for Thermal
- Abridged - does not show upstream resources or resource connections

## Legend

- A singleton resource
- A collection of resources
- A resource present in schema, but not relevant to Door HX

<https://drive.google.com/file/d/16IUmwHg0sMI3Br1QCwRet5wDjCcGLhYP/view?usp=sharing>

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# HMLC – Sensors

*Sensors identified for Door HX; commonality to be established*

- Supply Temperature (coolant/air °C)
- Return Temperature (coolant/air °C)
- Fan speed (rpm)
- State/Health (Redfish standard)
- Valve position (on/off or %)
- Flow rate (coolant l/s)
- Pressure (Coolant or  $\Delta$  air PA)
- Leak detection
- Particulate sensor (\*subject to local regs)



# HMLC – Controls

*Controls identified for Door HX; commonality to be established*

- Control Method (one of)
  - Diff air pressure
  - Outlet Air temperature
  - Return coolant temperature
  - Manual (cede control to upstream)
- Power Control
  - Safety cut-off to ITE
- Fan Speed
  - %
- Coolant Valve
  - On/Off
  - % open

# Next Steps

- Continue discovery for remaining sub-projects; ACF, Heat re-use
- Collaborate with DMTF Redfish to complete and publish WIP schema
- Investigate BIM integration
- Publish mockups
- Review/Iterate/Approve schema and mockups
- OCP Profiles and qualification requirements
- Security requirements



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# Q&A

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