NETCONF Simultaneous Requests

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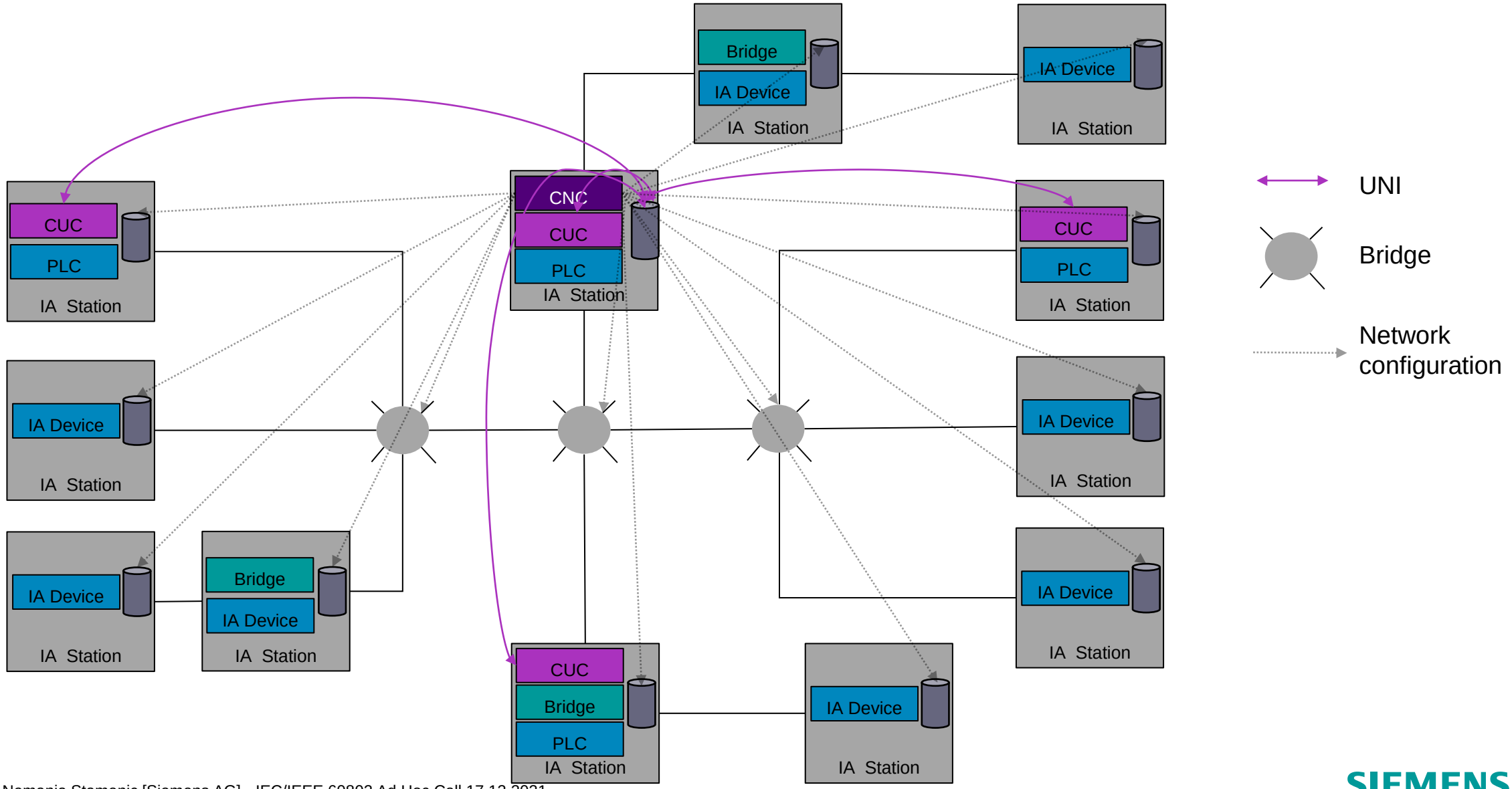
Single Domain – Multiple CUCs



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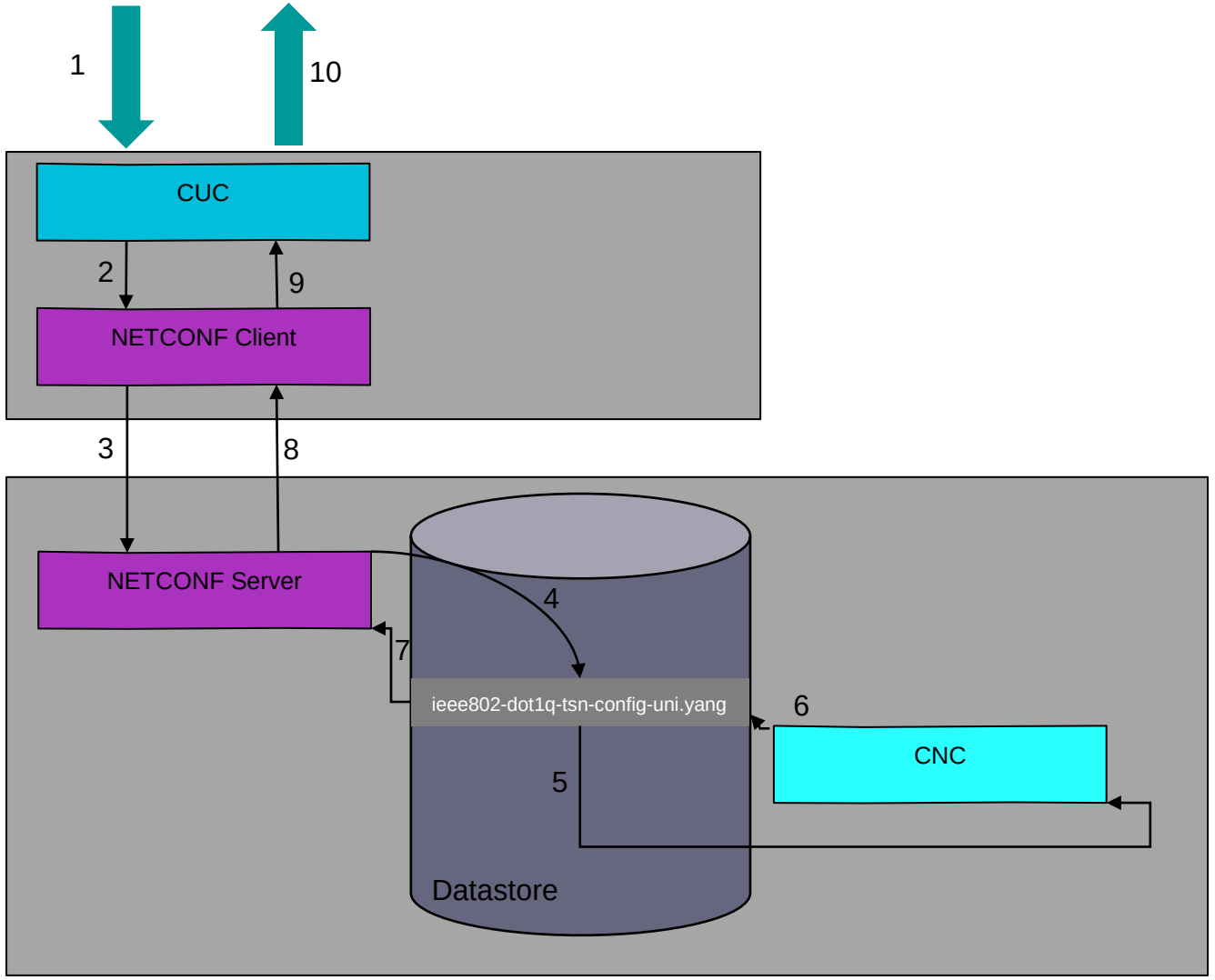
CUC – UNI - CNC dynamics



1. Stream Request
2. NETCONF client request
3. NETCONF protocol message
4. UNI-RPC call (e.g. add_stream)
5. Datastore update notifcation
6. Datastore update (stream conf)
7. UNI-RPC response
8. NETCONF protocol message
9. NETCONF client response
10. Stream confirmation

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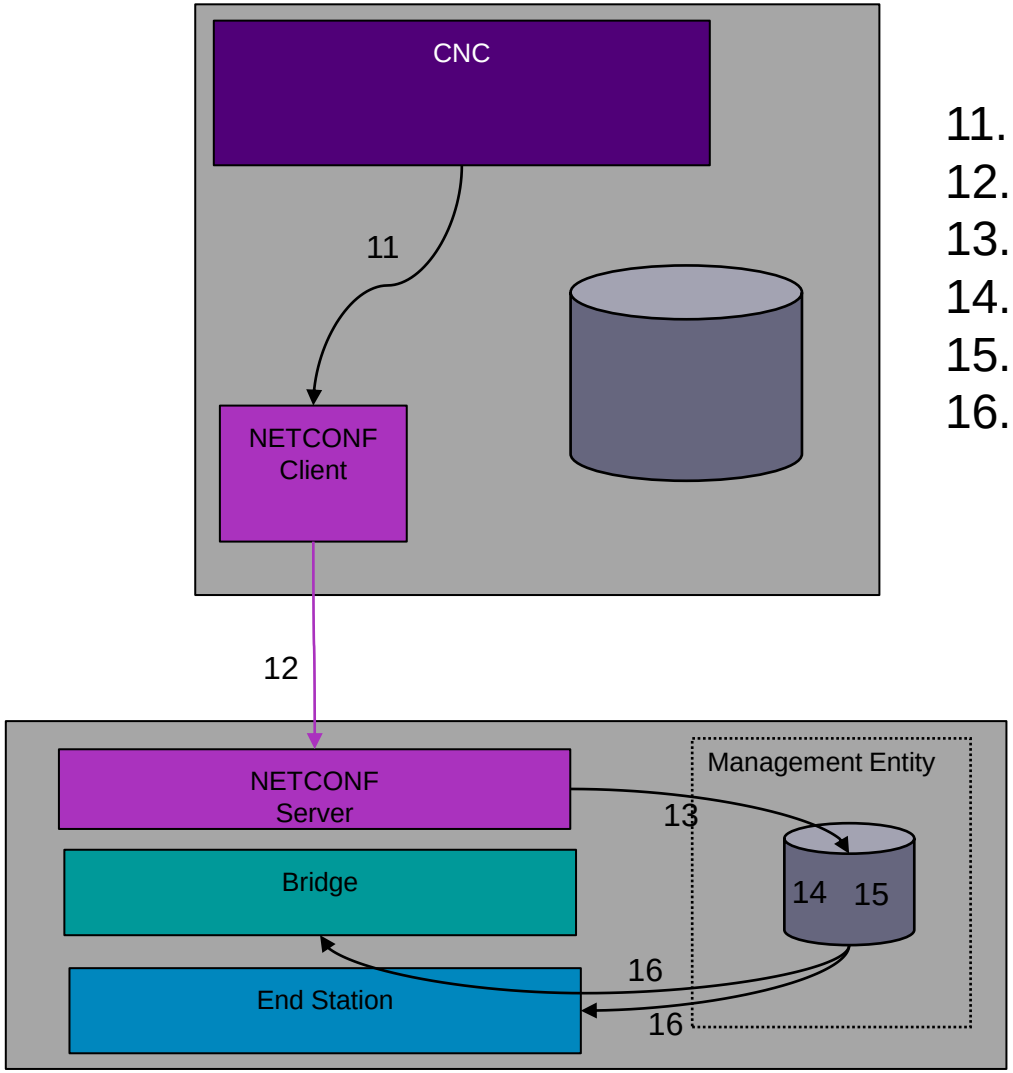
CNC Southbound IF



11. NETCONF client request
12. NETCONF protocol message
13. RPC e.g. <edit config>
14. Candidate DS update
15. Datastore commit
16. Configuration by management entity

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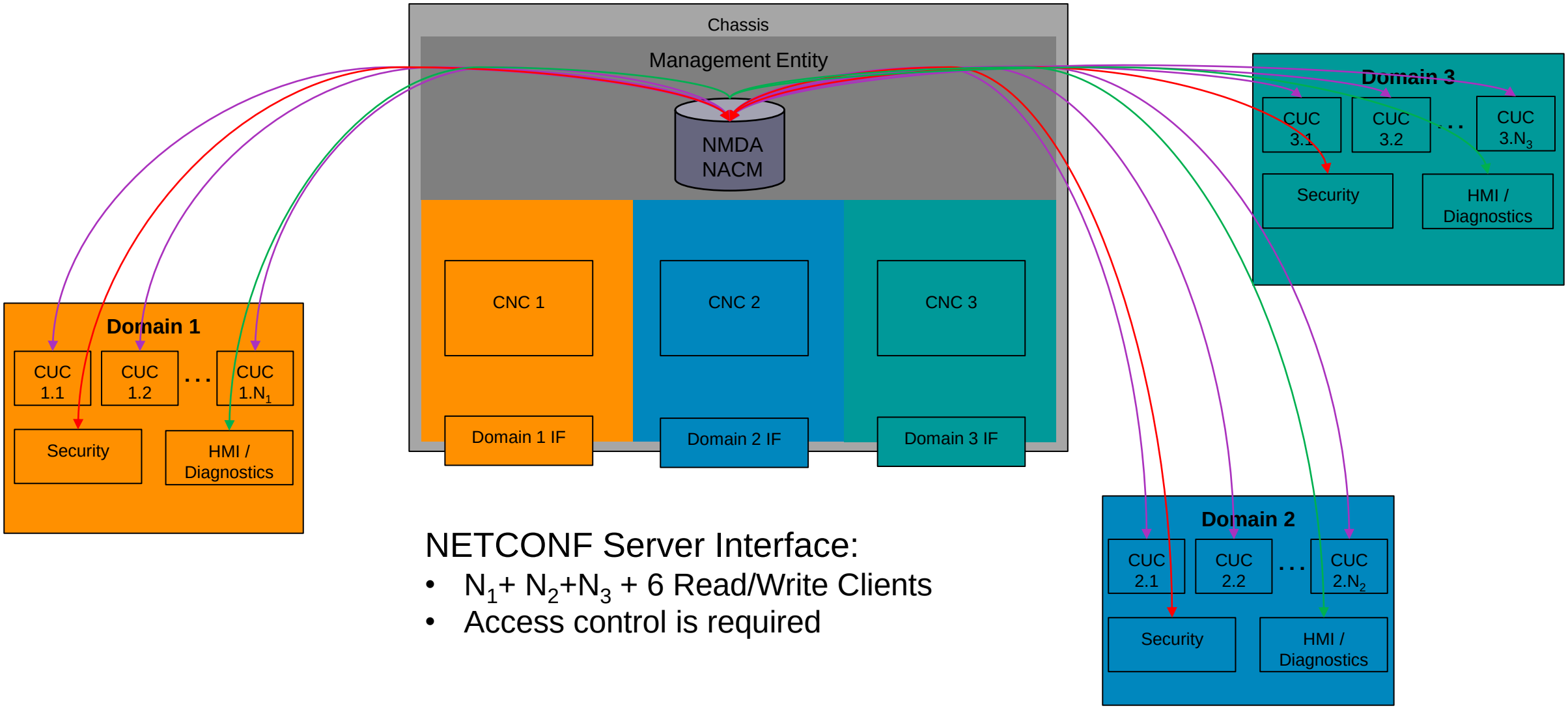
Multiple CNCs within one IA-Station



NETCONF Server Interface:

- N_1+ N_2+N_3 + 6 Read/Write Clients
- Access control is required

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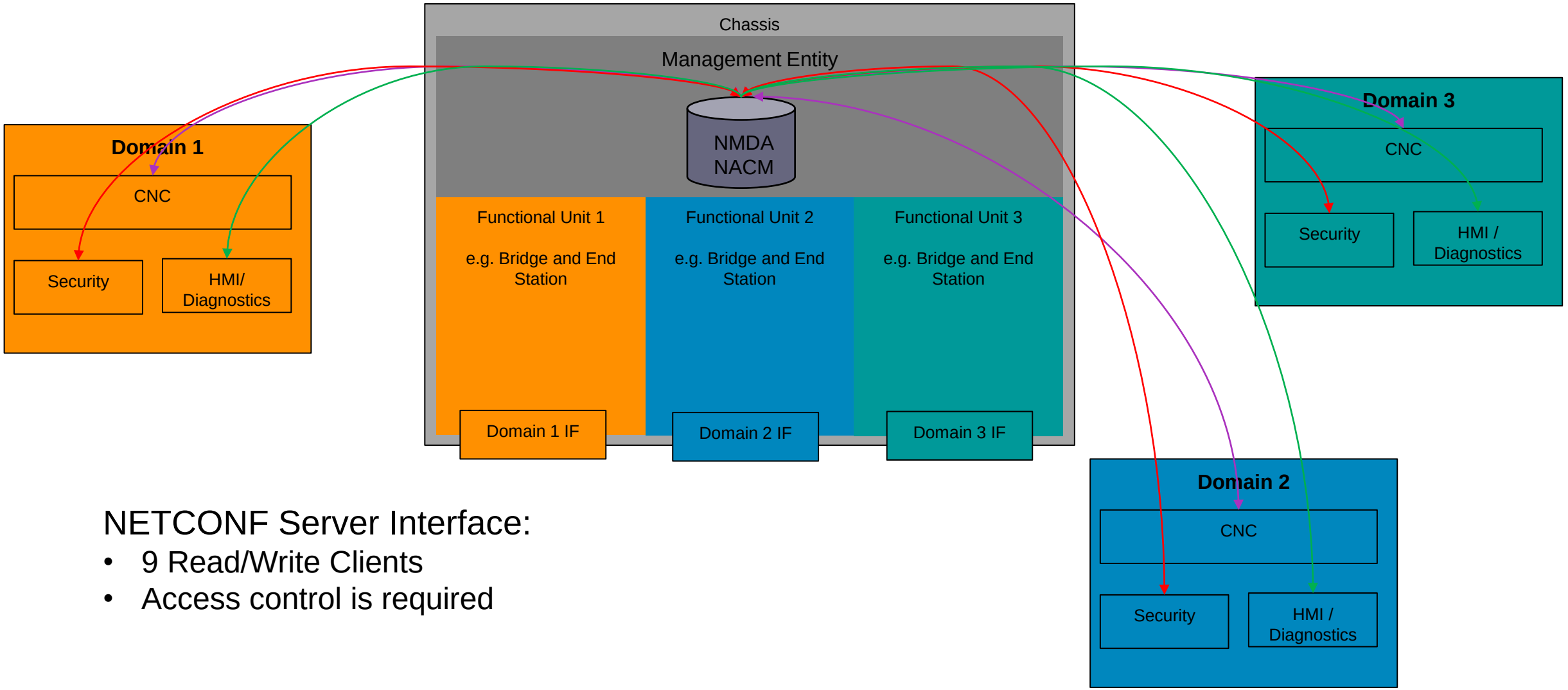

NETCONF Server Interface:

- 9 Read/Write Clients
- Access control is required

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Problem Statement – NETCONF Limitations

- Multiple clients will access (R/W) NETCONF datastores simultaneously
- Up to 30 clients access the NETCONF server implementing CNC northbound and southbound interfaces
- Serial access (global lock) is not acceptable due to unpredictable time behavior
- Working directly on <running> data store without consistency is not acceptable
- Partial-lock (RFC 5717) is possible only on the <running> data store, not on <candidate>
- There is no standard NETCONF mechanism to support these use cases

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Further Steps – NETCONF Limitations

- The problem was presented at the YANGSTERS meeting on 28.09.2021
- NETCONF experts from IETF were present
- Statement: standardization effort at IETF is needed to support IA use cases
- Suggested technical solution: NETCONF Transactions

  https://www.ietf.org/archive/id/draft-lhotka-netconf-restconf-transactions-00.txt
- Draft expired in December 2018

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NETCONF Transactions

- Support of the <candidate> datastore is required
- A new configuration datastore named <staging> is introduced
- It represents a staging area private to each user, it is subject to access control
- Essentially, each client gets it own non-shared <candidate> data-store
- Each client does not have to get a separate copy since efficient implementation methods exist (persistent data, copy-on-write – up to the implementors to decide)
- Commit operation automatically merges the content of the client‘s data store into <intended>. Merge conflicts result in an „operation failed – merge conflict“ response

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UNI Limitations

- Access control of the stream list on per TSN domain and on per client basis is necessary
- `ieee802-dot1q-tsn-config-uni.yang` proposes a „flat“ stream list - Streams[1..N]
- A hierarchical data model would fit better for the required access control.
  - Domain[1..n]
    - Client[1..k] -> *NACM (write access limited to “this” client)*
      - Stream [1...l]
- Root access to the stream list only via RPC
- Further limitiations of the UNI are adressed in comments of the current draft and in: https://www.ieee802.org/1/files/public/docs2021/60802-Stamenic-et-al-CNC-UNI-service-model-NETCONF-over-TLS-1121-v01.pdf , https://www.ieee802.org/1/files/public/docs2021/dj-Coelho-Uni-requirements-CNC-dynamics-ES-capabilities1121-v02.pdf

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UNI Further Steps

- When can the next PQdj draft be expected?

- Current state of UNI (IEEE PQdj) does not cover all IA use cases
  - Hierarchical stream list
  - RPCs to avoid polling
  - Notifications
  - Stream ID management
  - CNC and CUC requirements and informative text
  - …
- Work on a textual contribution is in progress, the goal is to have it integrated in the draft

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THANK YOU!

QUESTIONS?

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