slate

TTTech industrial

# Slate YNS (release 2021)

## Configuration software for plug-and-play OPC UA over TSN

- Automatically configures all standard TSN components via OPC UA
- Interfaces directly with OPC UA to hide network planning complexity from the user
- Enables dynamic addition/removal of publishers and subscribers in a system
- Scales for planning large networks and large industrial systems
- Integrates IEEE standard CNC and CUC functionalities

Slate YNS is an embedded software that interfaces with OPC UA applications to provide automated planning and configuration of TSN networks and devices. YNS does not require any user interface, it simply runs in a network device and facilitates the planning of data streams according to the requirements of OPC UA publishers and subscribers. Configuration of network components is achieved using standard YANG models and NETCONF.

### OPC UA Interface

Slate YNS includes a CUC server interface for automated stream requests from OPC UA stacks. Publishers or subscribers can inform the system of new stream availability or demands. This status information is tracked by the server, and if a relationship is established, it forwards the requests to the network planner. Requests include end-to-end communication parameters like cycle time, maximum latency, or seamless redundancy.

The direct connection to the OPC UA PubSub stack allows TSN to be fully transparent to the user. Setup of OPC UA communication is sufficient to automatically and dynamically build a real-time OPC UA over TSN network.

### Network Planner

TTTech Industrial's high-performance planning engine (also available stand-alone as Slate CNS) is built into the Slate YNS software. Planning starts after discovery of the network topology using LLDP, and the device capabilities via YANG. Once a stream publisher and at least one subscriber are online, the configuration for all TSN devices on the path between the endpoints is generated and deployed. Incremental calculation allows efficient operation by leaving already established communication relations untouched.

Planning covers IEEE 802.1Qbv schedules, IEEE 802.1Q bridge configuration, 802.1Qav credit-based shaping and IEEE 802.1CB stream redundancy setup. Slate YNS supports converged networks and individual stream isolation using IEEE 802.1Qci in order to protect critical traffic against disturbances.

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# Product Features



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|---|---|
| **Operating Systems** | Linux |
| **Requirements** | libxml2, libssh |
| **CUC** | PTCC server |
| **CNC** | Network discovery based on LLDP and YANG, or topology file input,<br>Dynamic and incremental client-based stream planning,<br>Netconf/YANG model-based deployment,<br>IEEE 802.1Qcc UNI compliant stream requests |
| **Topologies** | Line, star, ring, tree, ladder, line of rings, ladder of rings |
| **Device Types** | Switches, endpoints or switched endpoints that support the following derived YANG models |
| **YANG Models** | IEEE 802.1Qcw Scheduled Traffic (Qbv) and Per-Stream Filtering and Policing (Qci - available 2021)<br>IEEE 802.1Qcp Bridges and Bridged Networks (VLAN support)<br>IEEE 802.1cbcv Frame Replication and Elimination IEEE 802.1cbcv Frame Replication and Elimination for Redundancy (CB) - available 2021 |
| **NETCONF** | NETCONF 1.0/1.1 client |
| **CNC/CUC Planning Features** | **Support for different user defined constraints**<br>– End-to-end latency<br>– Transmit window constraint (for time aware streams)<br>– Incremental planning mode enables adding of new data streams and new devices without affecting existing scheduled data streams<br>– Incremental planning mode enables adding of new receivers for existing scheduled data streams e.g. for OPC UA PubSub or other industrial application protocols |
| **Delivery Package** | Installation guide<br>User manual<br>Embedded Software Core |

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