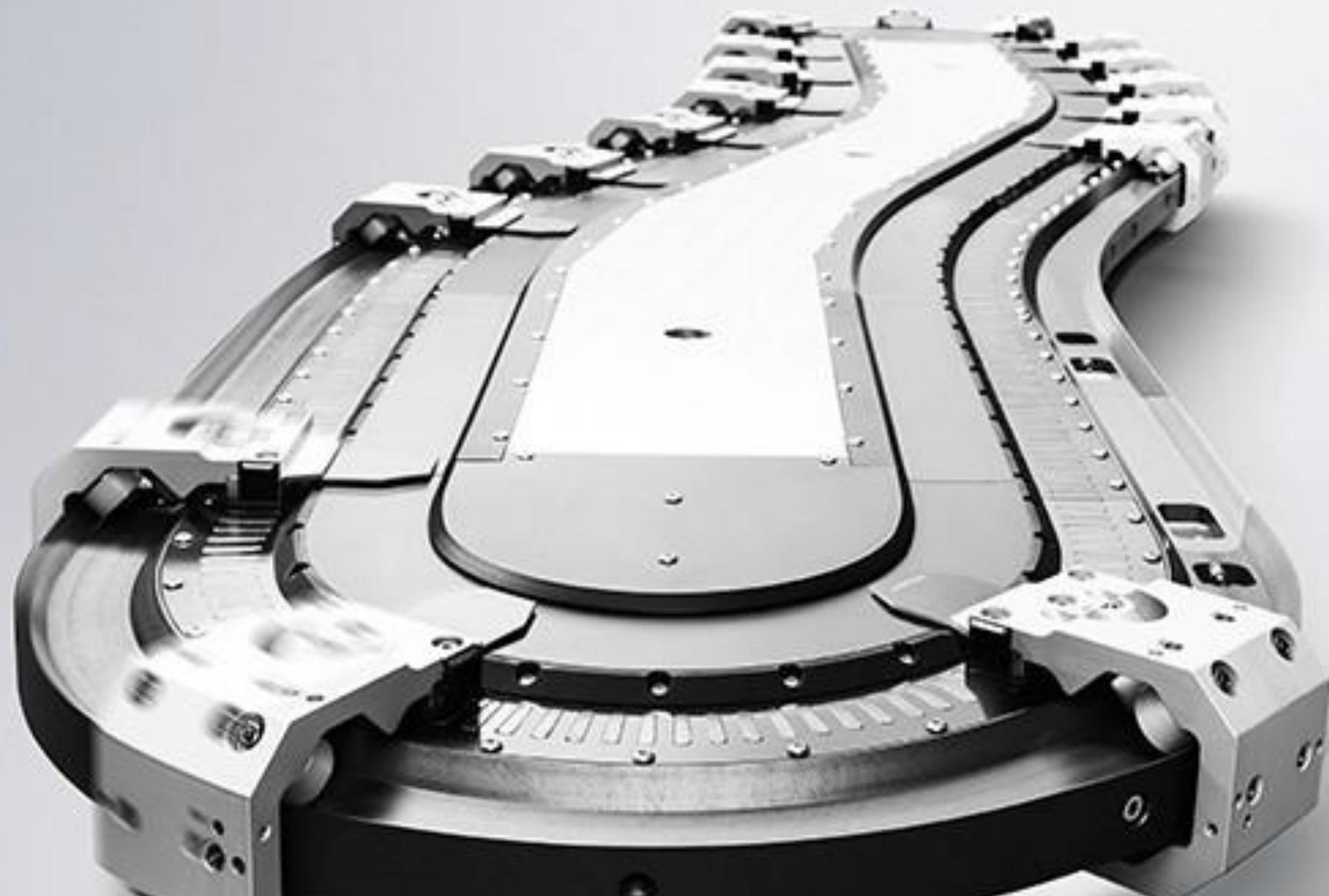


XTS TRANSPORT LAYER – Station Geometry

BECKHOFF



- **Station based approach**

- The station is the base building block of the XTS_TRANSPORT_LAYER
- The station is described by its geometric parameters
- The stations behaviour may be changed by changing its geometric parameters.
- The station may be part of Processes.
- A Process is controlling a range of stations via a single interface.

- **Station based approach**

- The station is tasked with the coordination of movement
- The station carries the geometric information on the track.
- The stations' list carries the mover information (ticket)
- The geometric information has influence on the stations' behaviour
 - How many nests?
 - How long the distance until release
- The geometric information has influence on the movers' behaviour within a station
 - Forward move
 - Backward move

- **Station based approach**

- The station is tasked with the coordination of mover targets
 - Halting in the states you answer to.
 - The station will wait here forever, isolated, doing nothing until commanded
- Sequential CASE execution states you only see in the logs.
 - The station must be able to execute without delay until the next roadblock (either a state you answer to or an error exit)
- Handover is atomic and is either successful or leads to a fatal error
 - The linked lists are not using dynamic memory allocation.
 - Static memory allocation [0.. MAX_LIST_NODES] is ensuring that no memory fault or heap fragmentation can occur.

- **Station based approach**

- Closed loop trade offs
 - No passing at all times.
 - This constraint is the main reason why lists may stay sorted simply by mapping the topology onto the logic.
 - High throughput and high speed
 - While a track switch enables highest flexibility regarding the mover targets
 - A track switch introduces a bottleneck which must be accounted for.

- **Station based approach**
- **Example of a closed loop XTS:**
 - **PROCESS** may have multiple stations
 - **STATION** may have multiple nests
 - **NEST** is a stop position for a mover

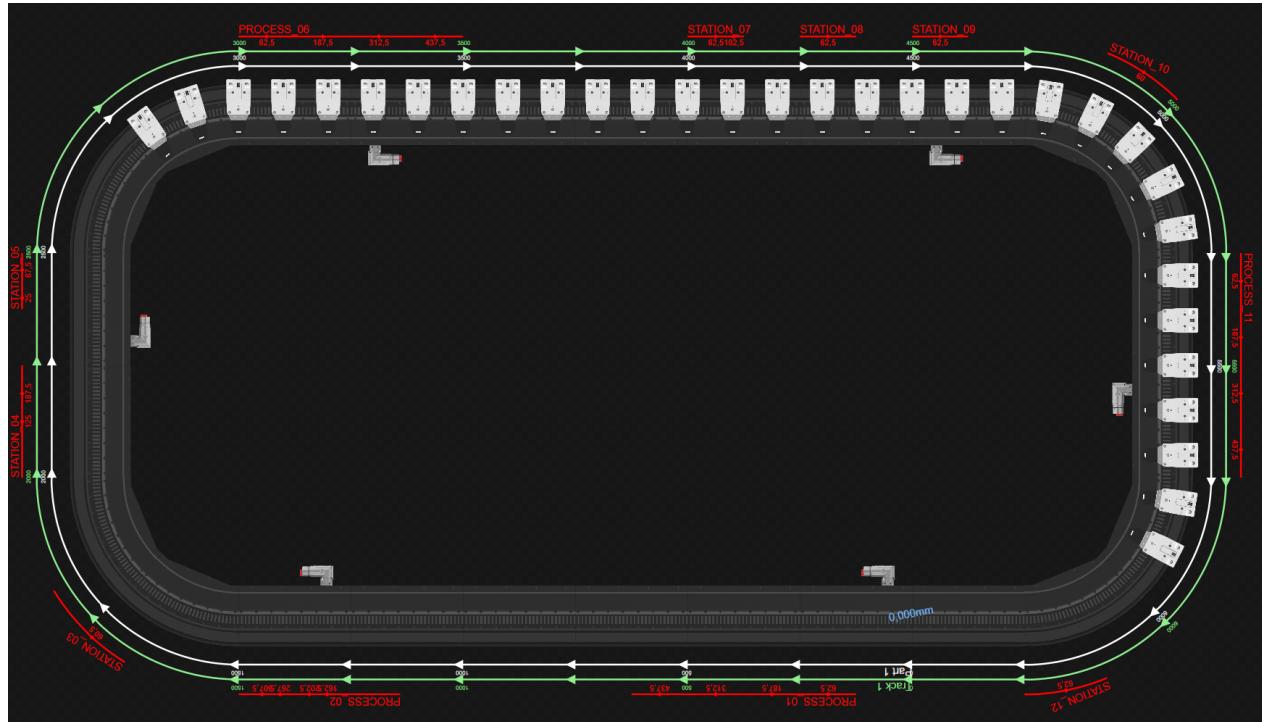


- **Station based approach**

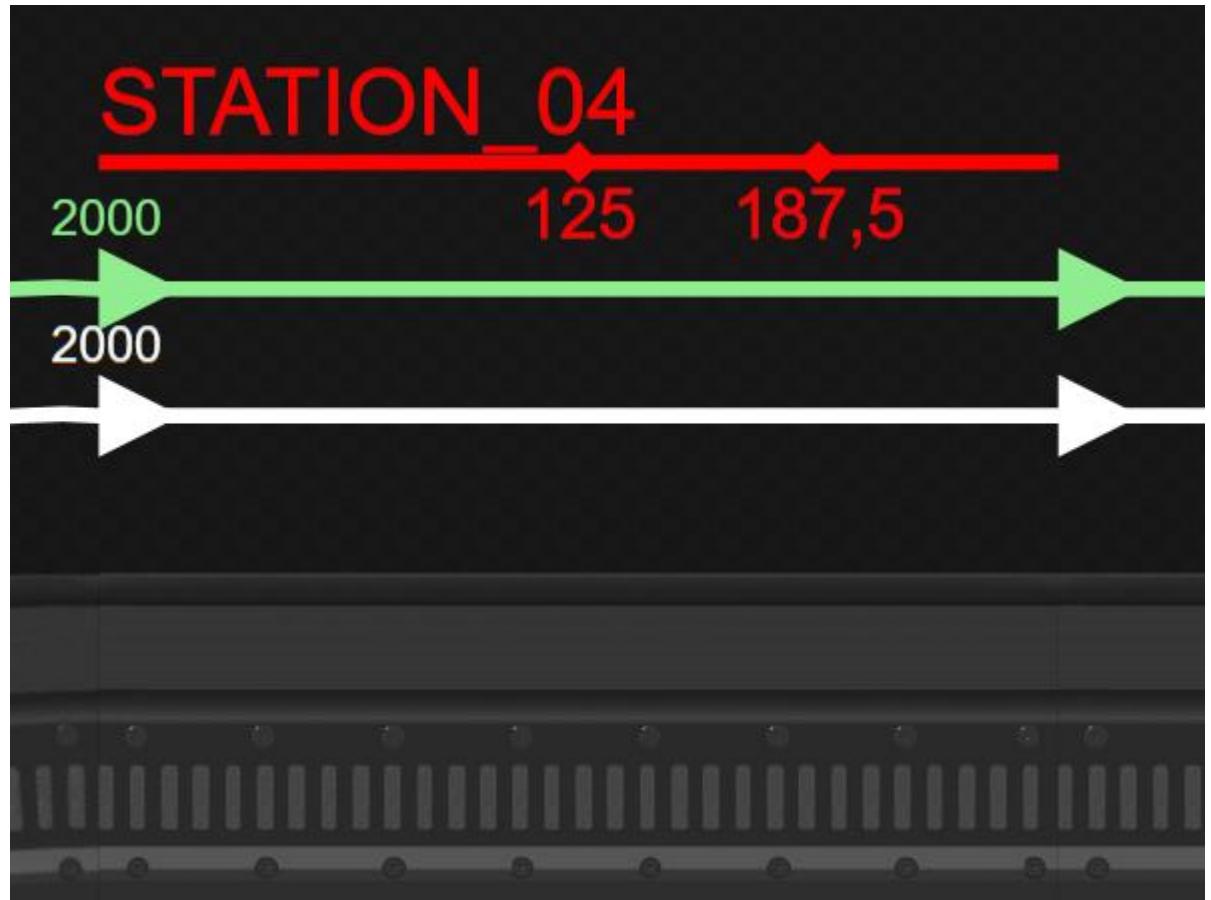
- **Base building block:**

- **STATION**

- Since the station logic is fundamental for understanding processes, we start by describing the stations' geometry first.



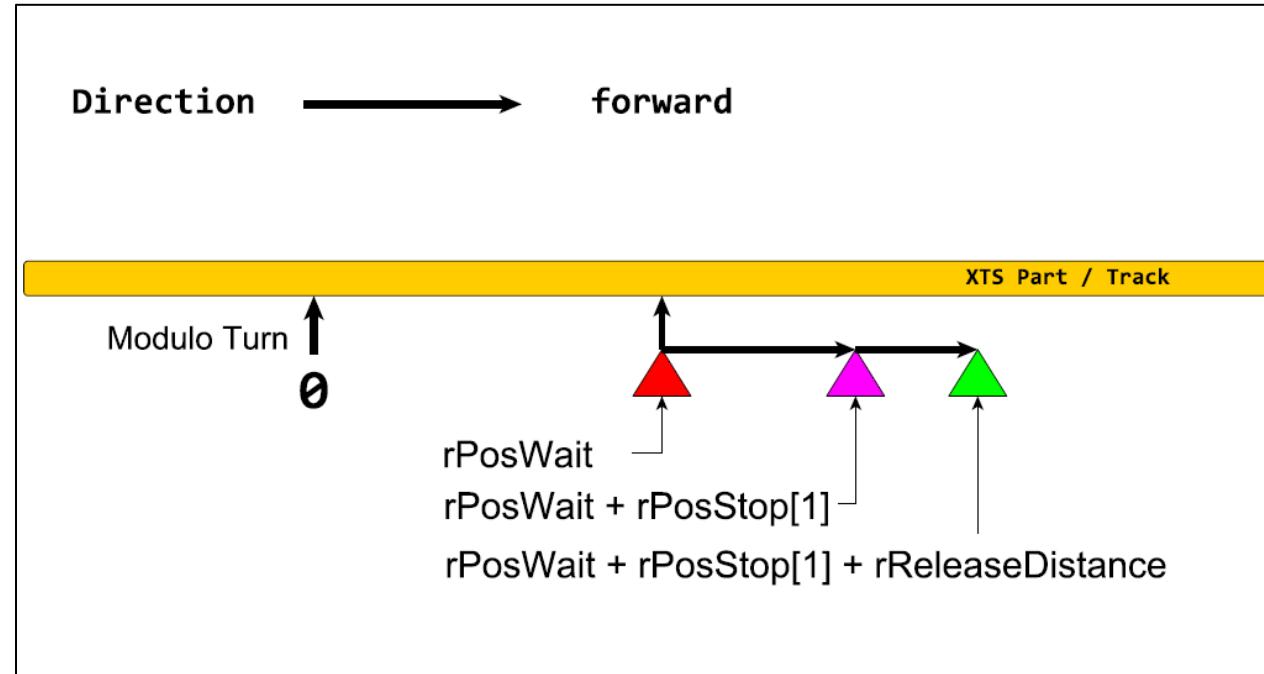
- **Station based approach**
- **STATION geometry:**
 - **WaitPos:** a position on the track where the station starts, and any other station may send a mover to.
 - **StopPos:** 1 to 8 possible **relative** positions a mover may stop at.
 - **ReleaseDistance:** distance a mover has to travel to logically leave a station.



- **Station based approach**

- **STATION geometry:**

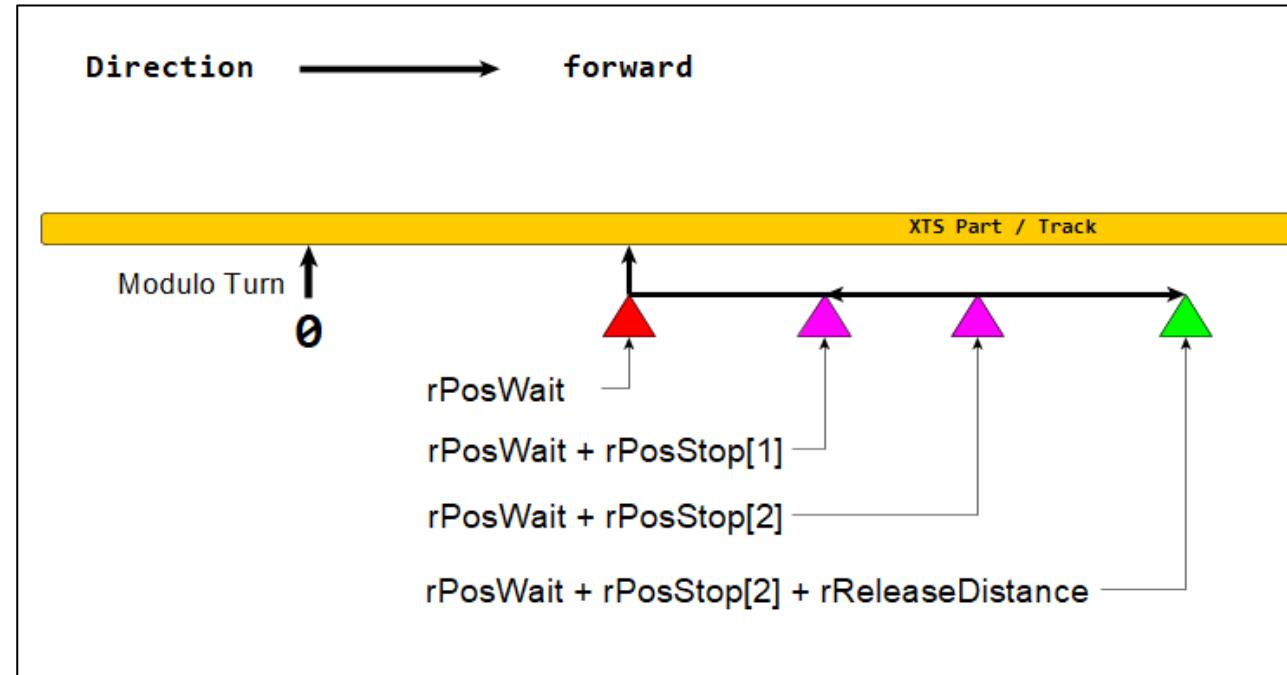
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- **Station based approach**

- **STATION geometry:**

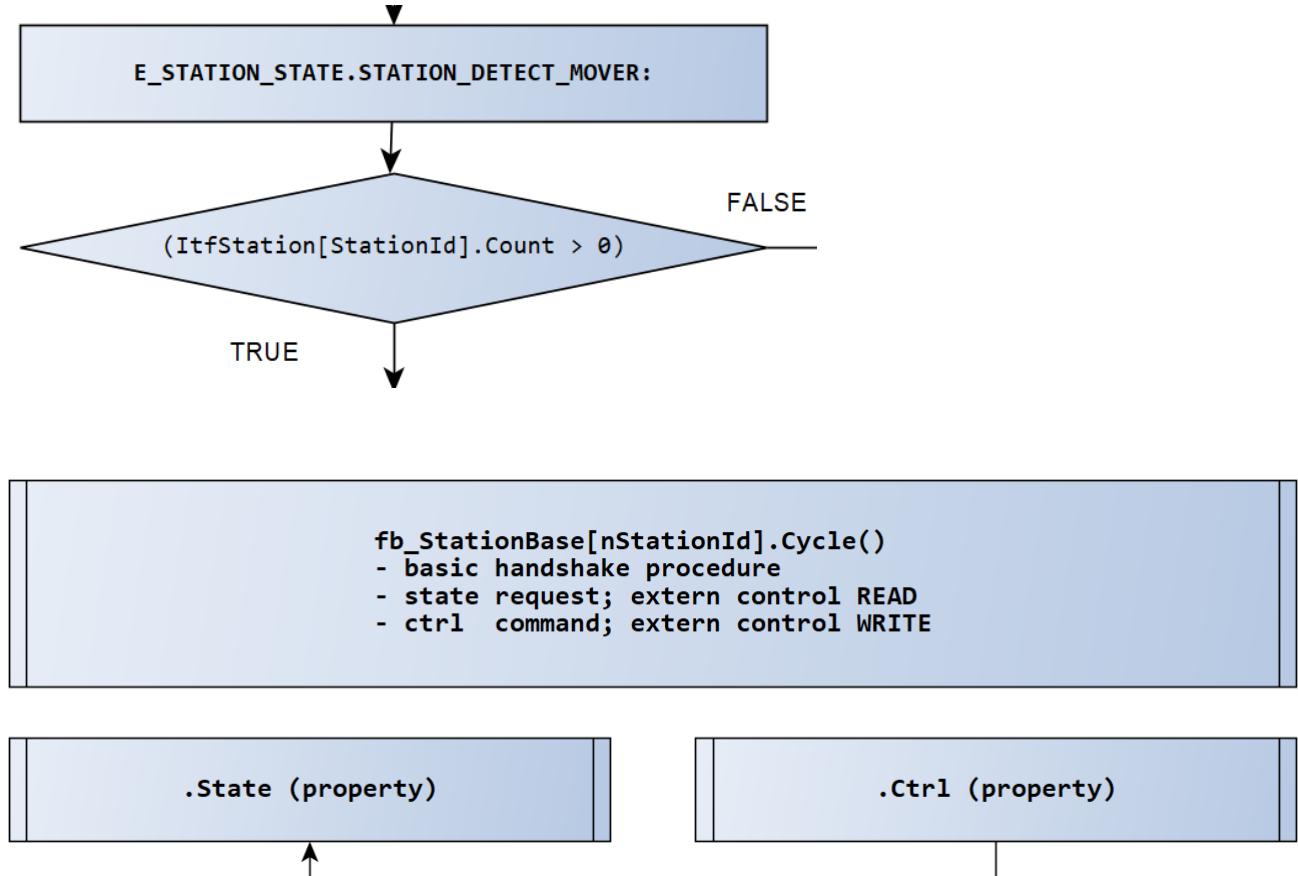
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- **Station based approach**

- **STATION operation:**

- **StationList:** a list in which a sending stations writes the mover ticket for this station. Station checks its own list cyclically and reports detection of a new mover.
- **StationCtrl:** control struct to command station
- **StationState:** state information you have to react to.

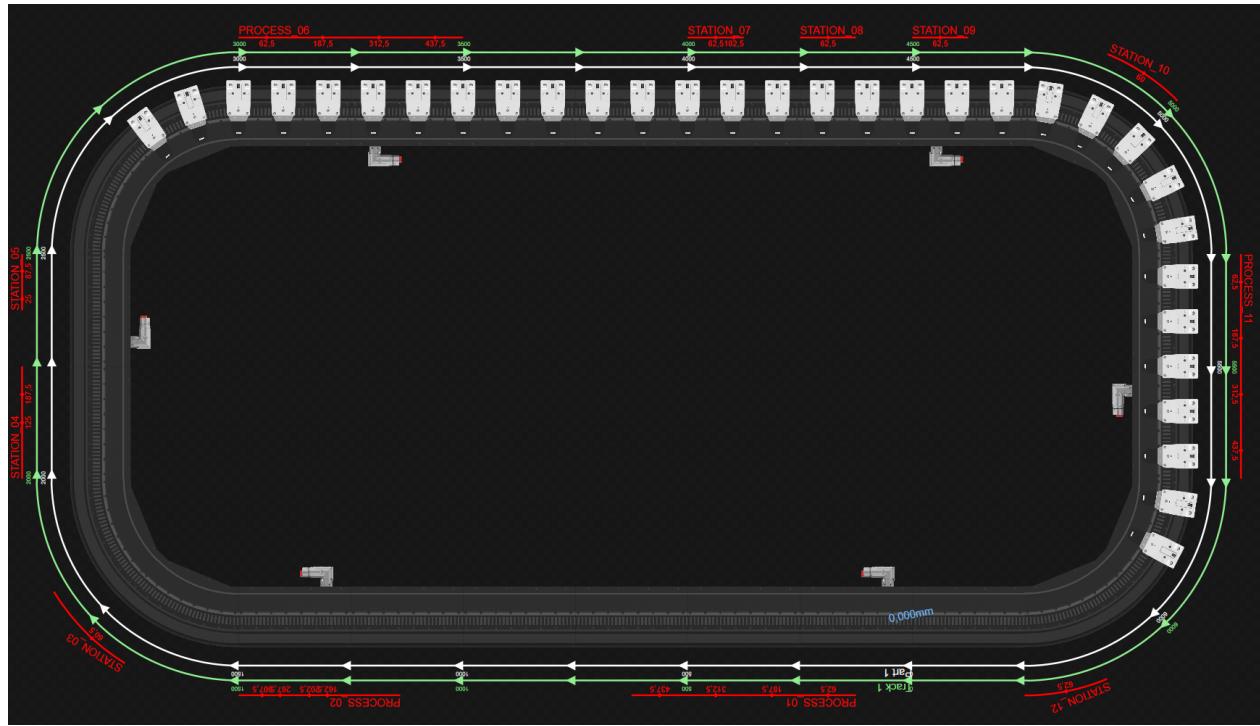


- Station based approach

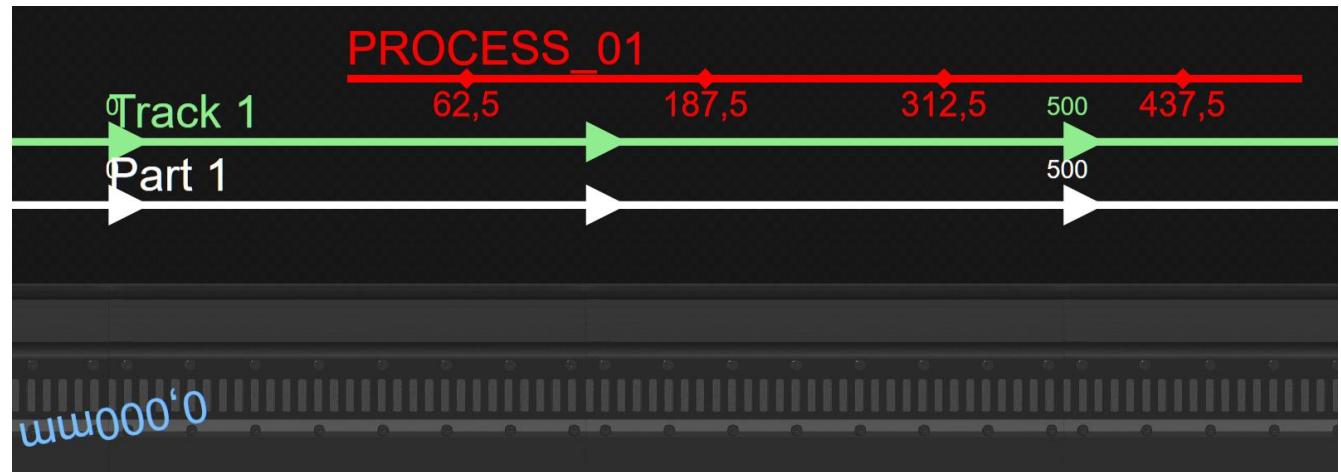
- ## ▪ **Grouping building block:**

– PROCESS

- The process abstraction is intended to give you control over a range of stations by using one dedicated interface.
 - The process commands and checks all its stations
 - Stations may be muted during runtime, so event driven decision making is possible for every batch individually.



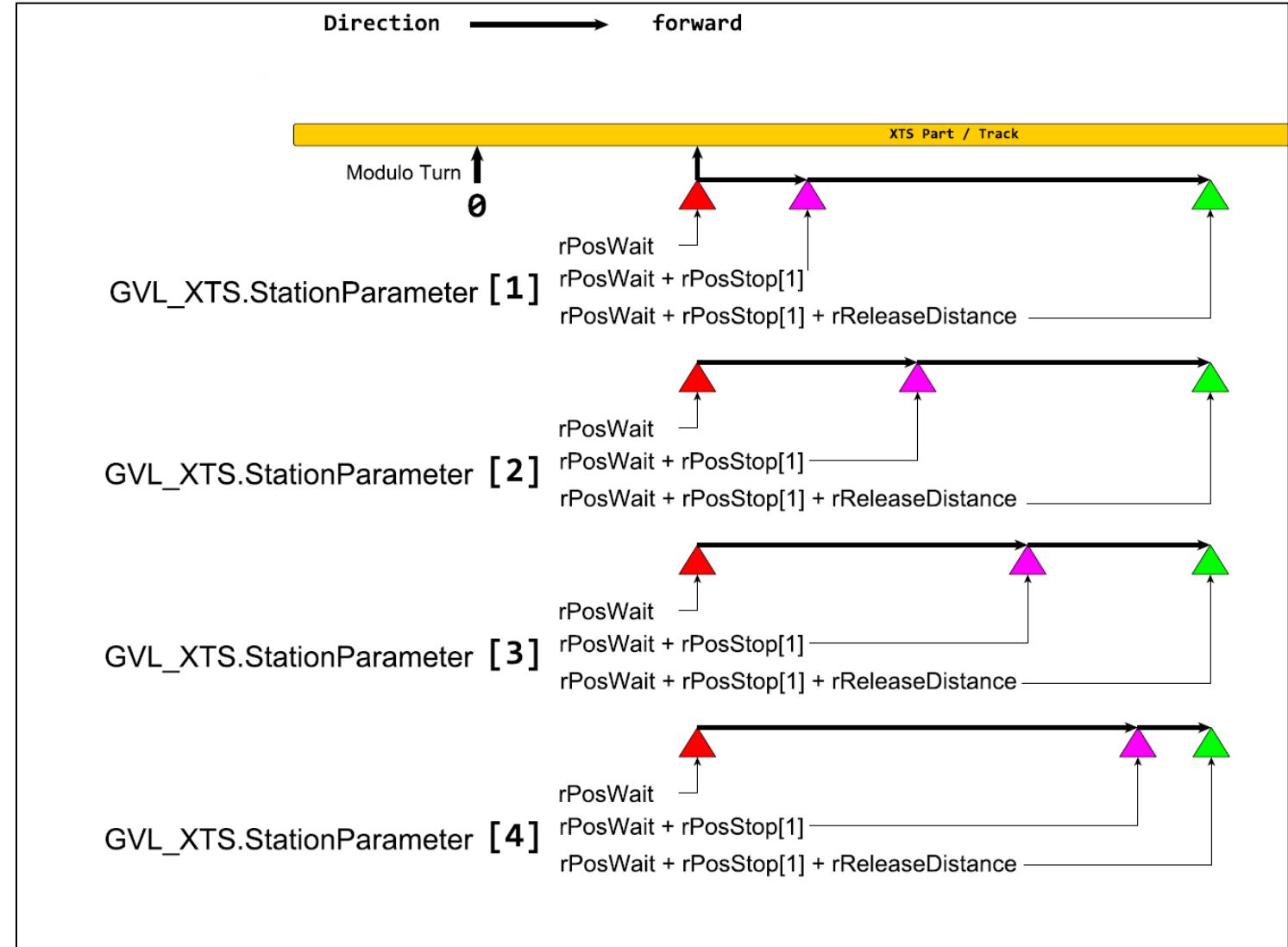
- **Station based approach**
- **PROCESS:**
 - may have one or many stations
 - works stations simultaneously
 - may mute stations
 - Stations in processes may have multiple nests



- **Station based approach**

- **PROCESS:**

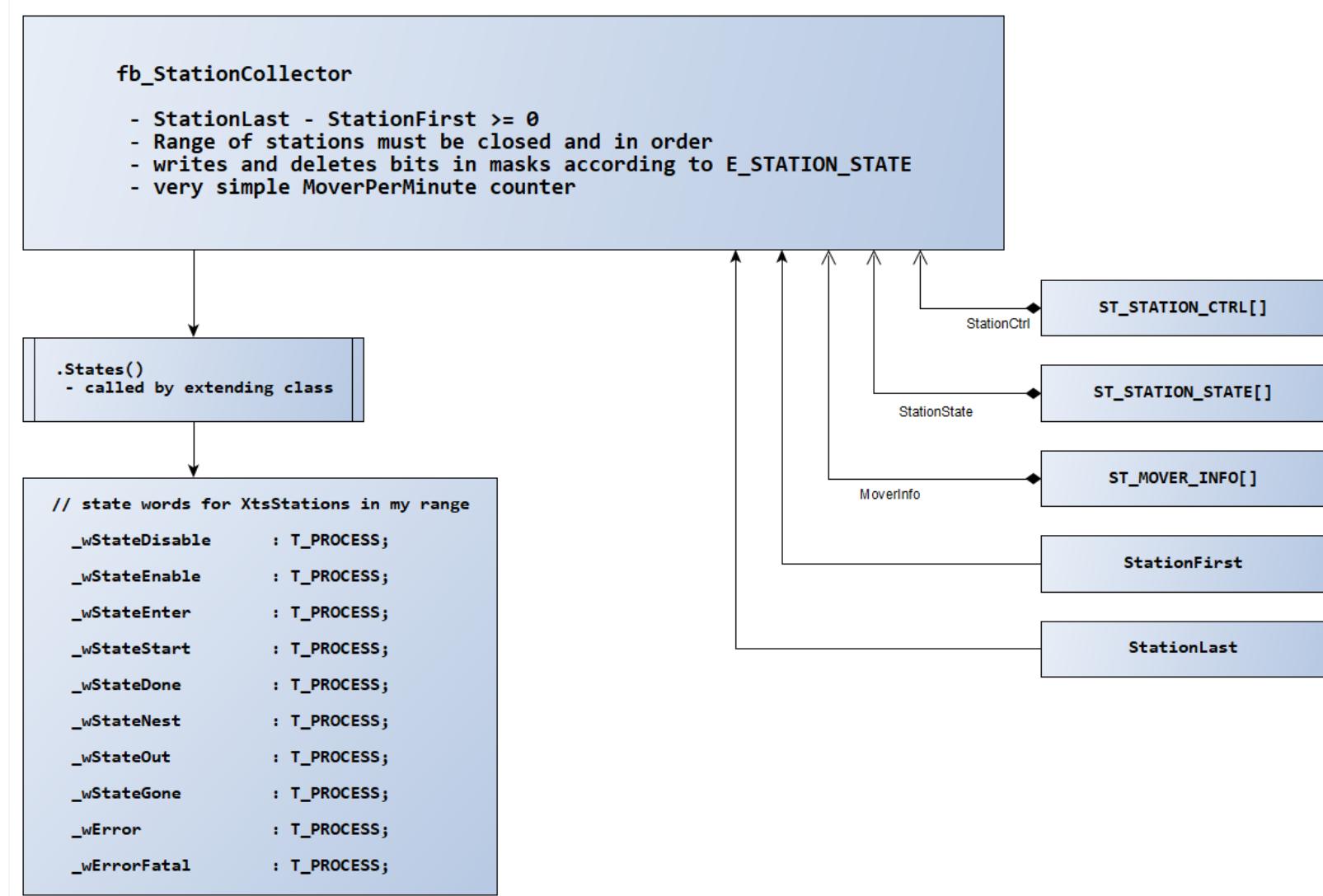
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- Station based approach

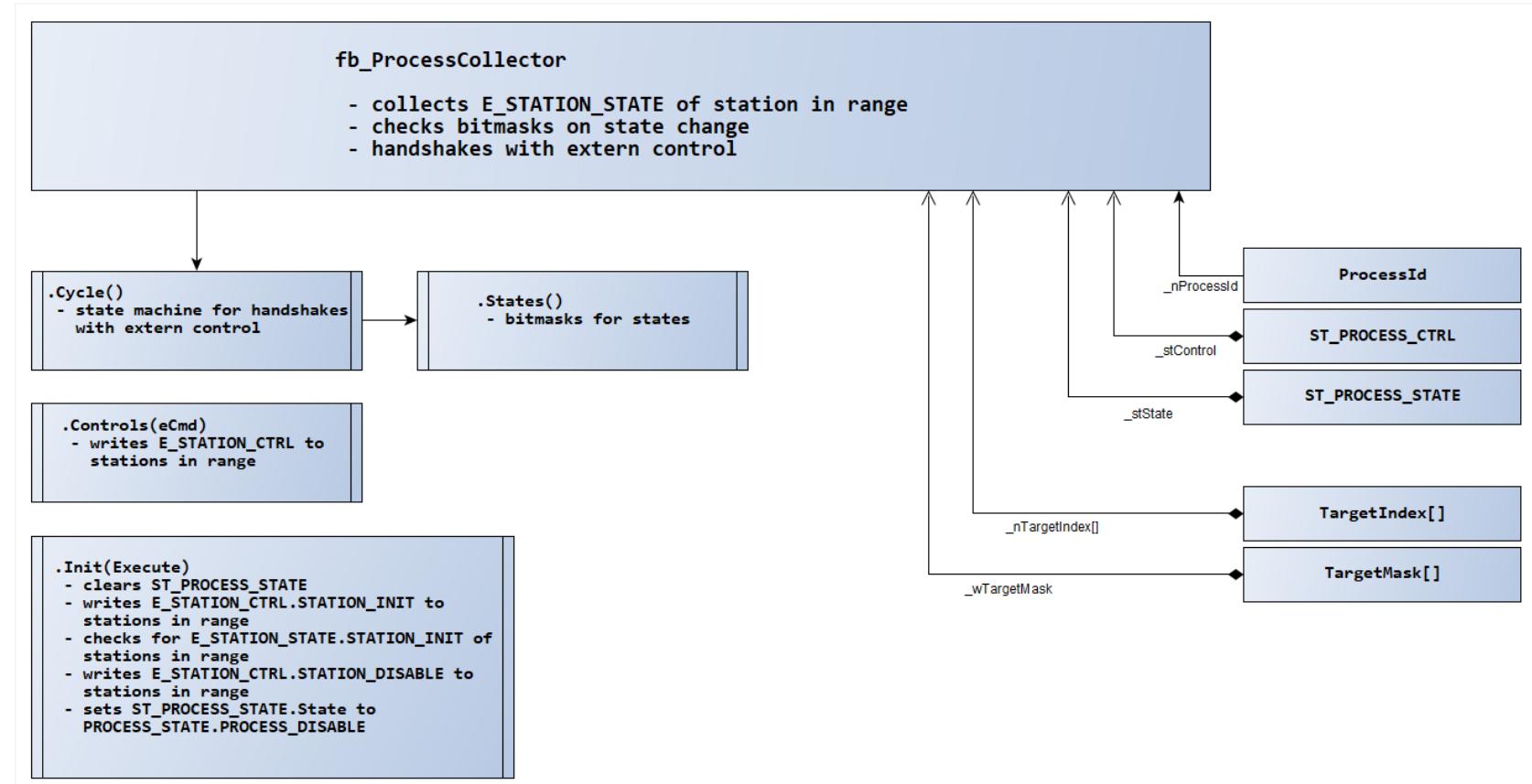
- PROCESS:

- collects information from the stations.



- Station based approach

- PROCESS:
 - commands stations via dedicated structures



XTS_TRANSPORT_LAYER project

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