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There are the following communication states for the EtherCAT:

Fig. 6: EtherCAT state machine

State	Description
Init (I)	<ul style="list-style-type: none">▪ No communication with application layer▪ Transition to “PreOP” (IP): Master configures slave register, e.g. address register and Sync manager for mailbox communication
Pre-Operational (P)	<ul style="list-style-type: none">▪ The mailbox communication on the application layer is possible as of “PreOP”▪ Not yet any process data communication▪ Transition to “SafeOP” (PS): Master also configures process data mapping (FMMU) and Sync manager for process data communication
Safe-Operational (S)	<ul style="list-style-type: none">▪ Process data communication. Only input data is analyzed. Output data remains in the “safe state”▪ DC synchronization is adjusted
Operational (O)	<ul style="list-style-type: none">▪ Process data communication: Input and output data is valid▪ DC synchronization
Bootstrap (B)	<ul style="list-style-type: none">▪ Optional state in EtherCAT slave devices (recommended for firmware update)▪ The state “Bootstrap” can only be reached from “Init”▪ No process data communication▪ Mailbox communication via FoE (FoE only possible in “Bootstrap” => device-specific)

Additional information:

- An EtherCAT slave device can be switched to a “lower” state than the master bus state, e.g. if the EtherCAT is in the bus state “OP”, a slave can be switched individually to “PreOP”.
- Only a master can initiate a change in state. Otherwise, a slave can only “downshift” its state in case of error.

