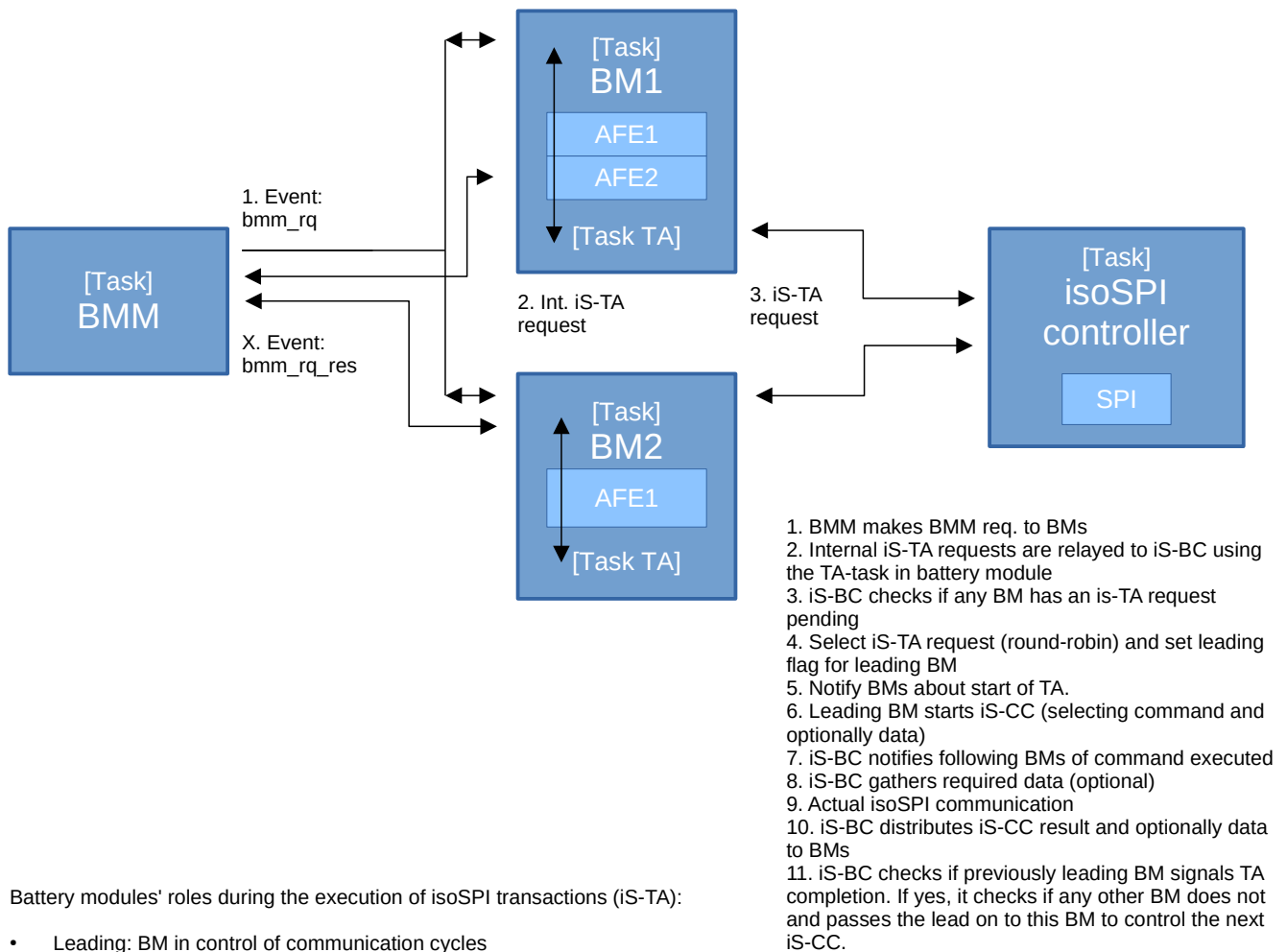


Async io version

| | |
|-------|---|
| BMM | Battery module manager |
| BM | Battery module |
| AFE | Analog front end (daisy chained hardware counterpart the BMM actually communicates with via the isoSPI bus) |
| iS-BC | isoSPI bus controller |
| iS-CC | isoSPI communication cycle (select command, pass data, evaluate result) |
| iS-TA | isoSPI transaction (uninterrupted sequence of CCs) |



Battery modules' roles during the execution of isoSPI transactions (iS-TA):

- **Leading:** BM in control of communication cycles
 - Selects next command (incl. options and timeout), optionally supplies data to write
 - Receives read results, command timeouts
 - The lead can be passed on to a previously following BM (if leading BM indicates being finished and the following module would like to append communication cycles (e.g. COMM-commands).
- **Following:** BM makes use of communication without being in control of the communication cycles
 - Occurrence: Usual case as not all BMs can be leading
 - Receives next command, optionally supplies data to write
 - Receives read results, command timeouts
 - If the transaction followed was the same as originally requested by the following BM and order of communication cycles fitted the expected scheme, the original transaction request is assumed to be fulfilled and cleared.
- **Dragged:** BM takes part to minimal degree to allow communication
 - Occurrence: Active transaction is unknown or implemented differently in this battery module from the leading battery module or the leading BM is done and another module extends the iS-TA.
 - Known write commands get supplied last known data for registers or "notx".
 - Results of all command are ignored.

Communication cycles (iS-CC) within iS-Tas:

- Always six-stepped to keep logic more robust (even if a single BM or a command would not require all steps)
- Steps
 - 1) Leading BM: Command selection and optionally data gathering
 - 2) IS-BC gets command from leading BM and distributes it to following BMs
 - 3) Following BMs gather data for write commands (optional)
 - 4) Execution, incl. optional, writing or reading of data or polling for completion
 - 5) Evaluation of command result; BMs declare intention to extend iS-TA or not
 - 6) Done – At this point the iS-BC updated all BMs on the possible extension of iS-TA with another iS-CC