ASAM iLinkRT V3.0.0
Release Presentation

High-Speed Automation Access protocol for MC-Server

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Agenda

Introduction

- iLinkRT describes a multi-client / multi-server architecture for the purpose of fast channel based communication between MC-Servers (e.g. application system for electronic control units (ECU)) and MC-Clients (e.g. system for test automation).

- Main Topics

  - Support of configuration and parameterization.

  - Standardized handling of preselected Devices (e.g. an ECU), Measurements and Characteristics.

  - Data acquisition.

  - Recording.

  - Adjustment.

System Overview
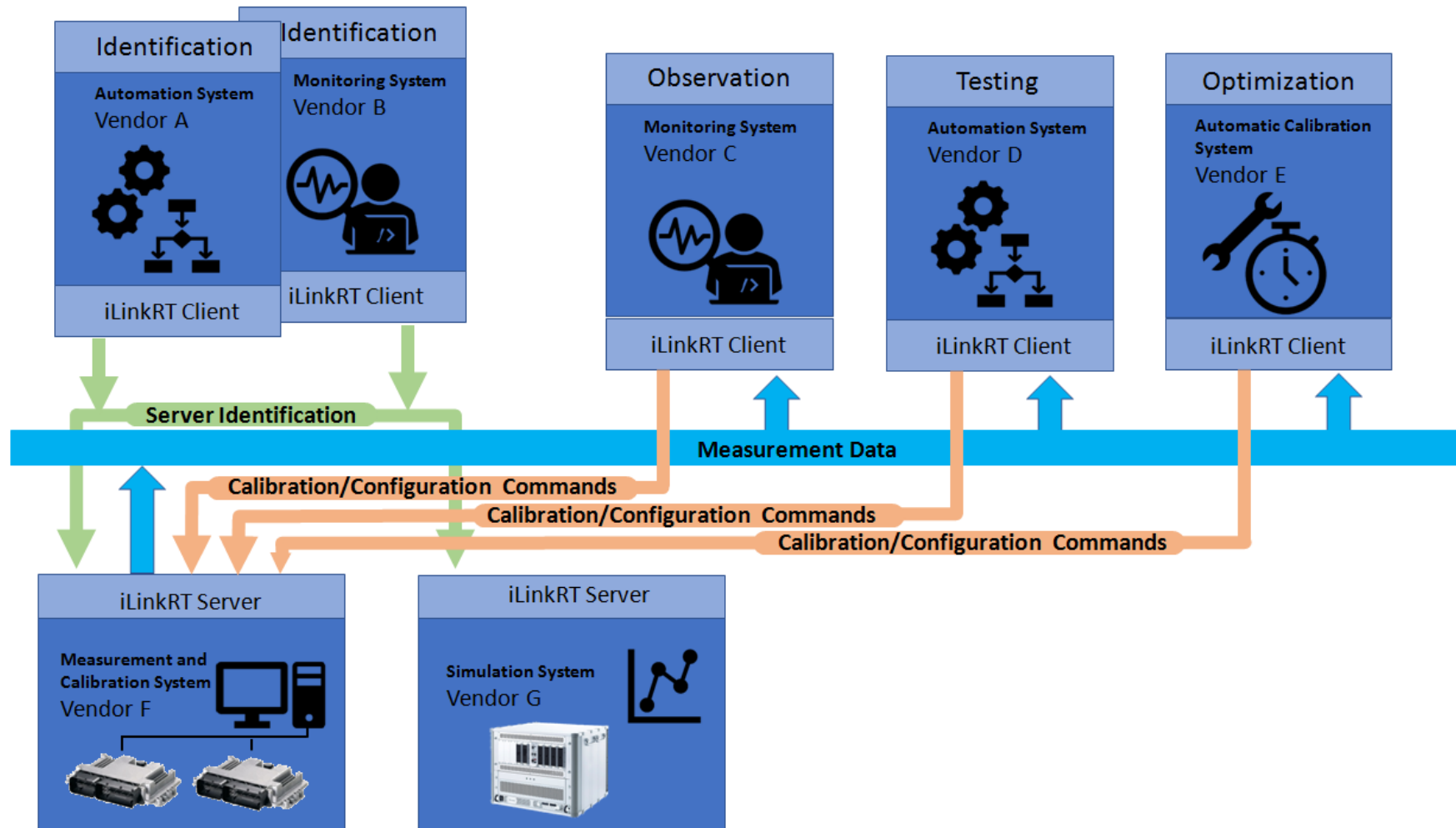
Motivation

- Be independent of ASAP3.

- Reuse the advantages of ASAP3 like simple protocol, implementation independency, easy to understand.

- Reuse the performance aspect of the high speed iLinkRT standard like event driven measurement, calibration parallel to measurement.

- Provide multiple MC-Client / MC-Server communication to support use cases with simultaneous use of multiple tools.

- Support local and wide area networks with IPV4 and IPV6 architecture.

- Be open for collaboration with other standards like e.g. XIL.

- Easy to use Recorder concept.

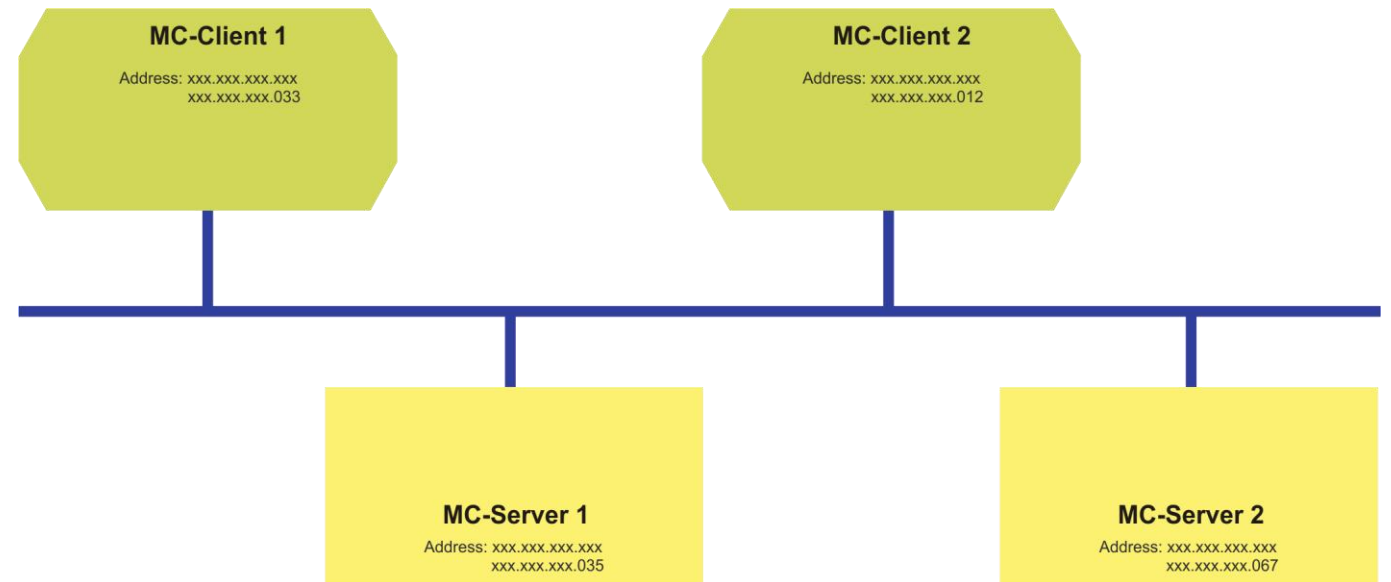- Easy extendable protocol for future demands.

New Features

Multi MC-Client / multi MC-Server connections

- Detect MC-Servers in the network via broadcast messages.
- Establish point to point connections between each MC-Client and each MC-Server (used for command exchange).
- Send data and events via multicast messages from MC-Server to all MC-Clients (highest performance).
- IP (V4 and V6) supported.
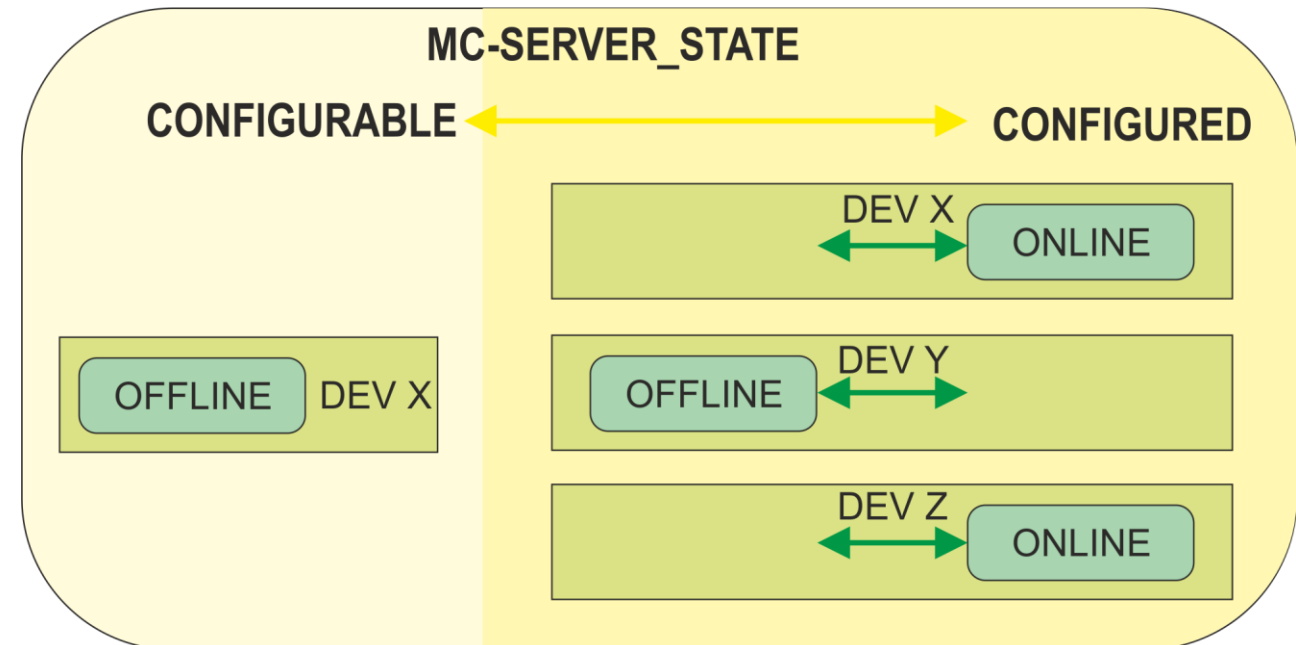
Performance increase

- Multiple iLinkRT frames (each containing exactly one DTO packet) can be sent in one UDP data packet.
- Allows to send multiple DAQs (data acquisition objects, specifically a list of measurements) simultaneously.

MC-Client 1
Address: xxx.xxx.xxx.xxx
xxx.xxx.xxx.033

MC-Client 2
Address: xxx.xxx.xxx.xxx
xxx.xxx.xxx.012

MC-Server 1
Address: xxx.xxx.xxx.xxx
xxx.xxx.xxx.035

MC-Server 2
Address: xxx.xxx.xxx.xxx
xxx.xxx.xxx.067

New Features

MC-Server Configuration

- Selection of a Device Set (e.g. a predefined set of devices).

- Selection of a device (incl. description and hex file, physical link).

- Query of existing MC-Server configuration.

- Assignment of identifiers for Measurements and Characteristics.

- In multi client scenario only one client can change the configuration at one point in time.

- Configuration change only possible, if no measuring is running.

- Establishing the Device connection.

- All MC-Clients will be informed by events about status change in MC-Server (e.g. Measuring, Recording, Device connection, MC-Server configuration).

MC-SERVER_STATE

CONFIGURABLE ⟷ **CONFIGURED**

DEV X — ONLINE

OFFLINE | DEV X

DEV Y — OFFLINE ⟷

DEV Z ⟷ ONLINE

ASAM

New Features

Configuration access

- Access to the most relevant data base properties (e.g. data type, dimension, limits, unit, raster).

- List of selected or preconfigured Characteristics, Measurements and Devices.

- Overview about raster's supported by the respective device, based on code scaling units defined in MCD-2 MC.

New Features

Measuring

- For the data transmission an event based DAQ mechanism is used.

- Each DAQ represents a different sample rate and is transmitted with a time stamp.

- Measurements can be sampled in physical or hex value representation.

- For each device the measuring is configured by a sequence of Measurements joined with a raster reference.

- Measurements can be sampled multiple times in different rasters.

- Each MC client can query the existing DAQ's, the content of these DAQ's and the sample rate for its internal synchronization. This is relevant after a configuration change has been made in an environment with multiple MC-Clients, each configuring the measuring.

- With measuring start the respective device will be switched implicitly to ONLINE.

- State model for measuring introduced.

MEASURING_STATE
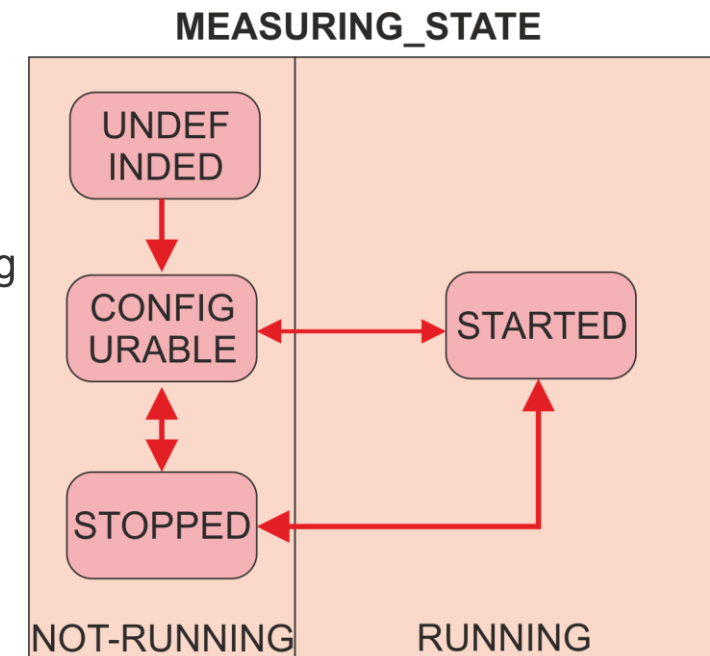
New Features

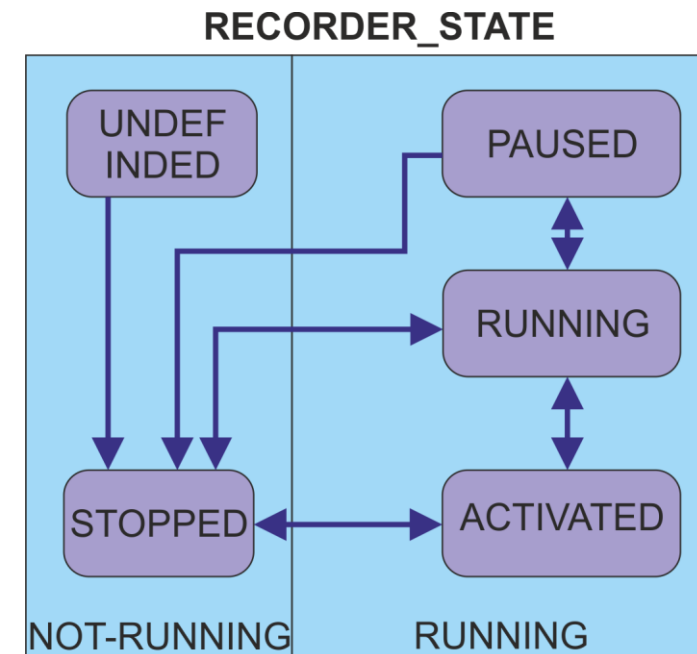**Measuring in multi client scenario**

- Each MC-Client configures, starts and stops its own measuring list separately. The **first** MC-Client starts or configures the measuring and the **last** MC-Client stops it.

- All MC-Clients which have started the measuring have to stop it later! Measuring is only stopped when all MC-Clients that have started the measuring have also stopped it.

- Each MC-Client can only delete his own configured Measurements for measuring.

- To simplify the synchronization process between multiple MC-Clients, information about the DAQ list layout with the values NO, PRECONFIGURED, UNCHANGED, EXTENDED and CHANGED is introduced to signalize modifications.

New Features

Recording

- One global recorder in the MC-Server for all MC-Clients

- The data stream of all configured measurements is stored.

- Recorder modes:
  - ➢ Untriggered
  - ➢ Triggered
  - ➢ Re-Triggered

- Trigger conditions expressed by ASAM General Expression Syntax

- CONDITION triggers for start and stop and TIME_SPAN_DURATION trigger for stop

- Trigger effect can be extended with delays

- Key / Value pairs of meta data can be added to the recorder file

- Client bookmarks can be added into the data stream

- Recorder file name supports special tokens (e.g. data recording start time)

- State model for recording introduced

RECORDER_STATE

New Features

Recording in a multi client scenario

- One MC-Client can control the recorder exclusively. This requires that the MC-Client that started the recording also stop it.

- A running recorder is protected against configuration changes and measuring stop.

- It is possible to record data immediately when the measuring is started.

- MC-Clients can be informed by the MC-Server of a requested activity (e.g. stop recording) from a different MC-Client; A cooperative MC-Client takes such requests into account, but decides whether or not to comply with the request based on the current task.

New Features

Adjustment

- Adjustment variables are operated sequentially.

- Support of complex characteristics
    - Access to cell values and axis values.
    - For cell values a range can be specified.
    - Cell values can be modified individually or by a constant, an offset or a factor for the whole selected range.

CALPAGE

- Switching between multiple CALPAGEs supported.

- With device connection an automatic CALPAGE adjustment between MC-Server and Device takes place.

Other Changes

Common

- Check for time synchronization in the MC-Client for different MC-Servers possible.
- MC-Client - MC-Server watchdog feature introduced.
- The protocol is based on UDP/IP. A counter allows the detection of missing packets.

Administrative

- Query of available Device Sets, Devices, Measurements and Characteristics.
- Execution of MC-Server vendor-specific services.

Error Handling

- Harmonization of standard error codes.
- Extended with vendor-specific error codes.

Backward Compatibility

- iLinkRT 3.0 reuses the basic data transfer concept of iLinkRT 2.0.

- As iLinkRT 3.0 extends the multi-client functionality and adds configuration the commands of iLinkRT 2.0 are not reusable one by one.

- Therefore this standard version is not backwards compatible to earlier iLinkRT versions.

Relation to Other Standards

MCD-2 MC

- Support of described Measurements.

- Support of described Characteristics.

- Taking over of raster description.

Deliverables

Documents

- iLinkRT V3.0.0