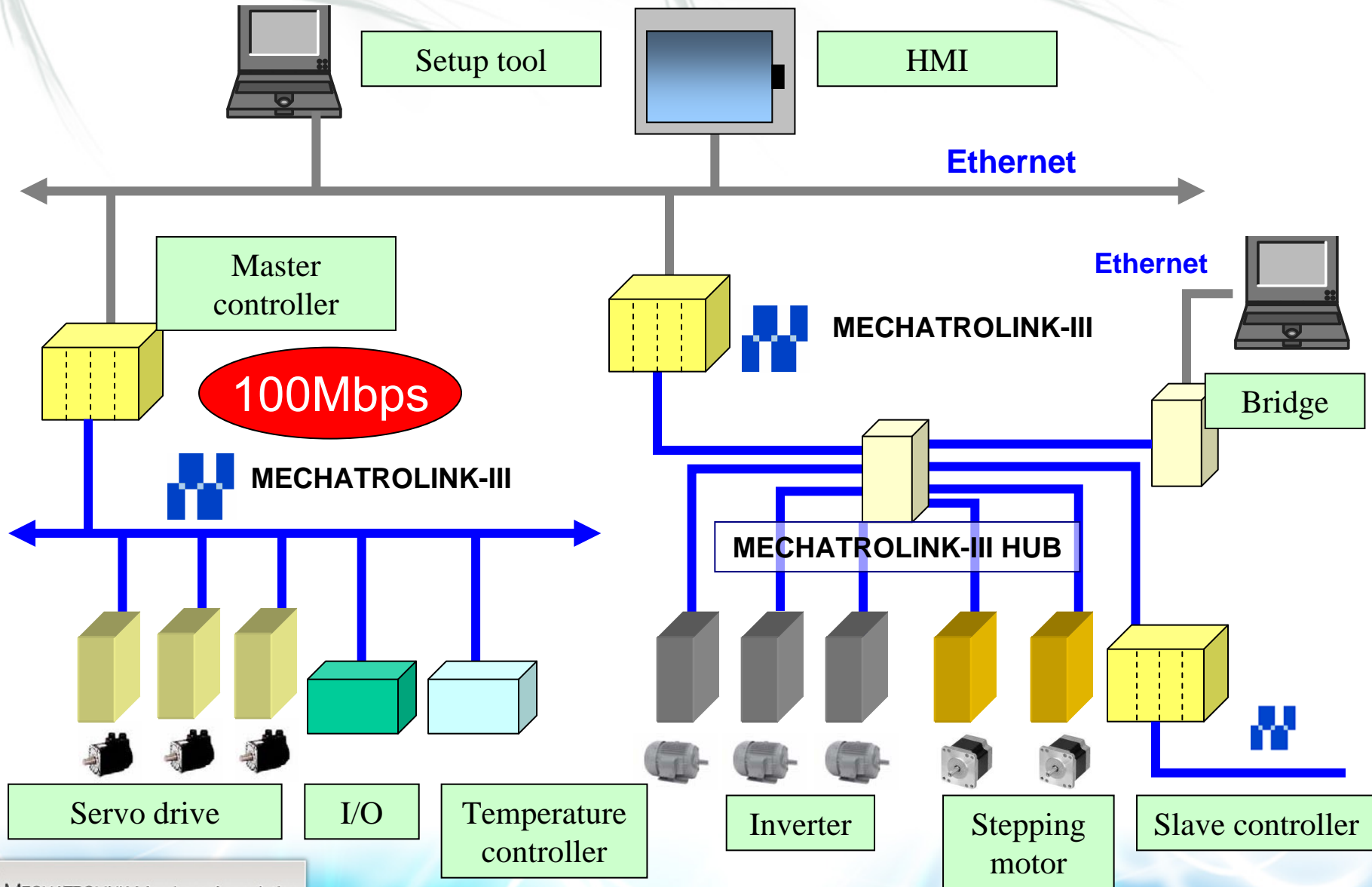


MECHATROLINK-III Outline



MECHATROLINK Members Association
2010.8

MECHATROLINK-III system architecture

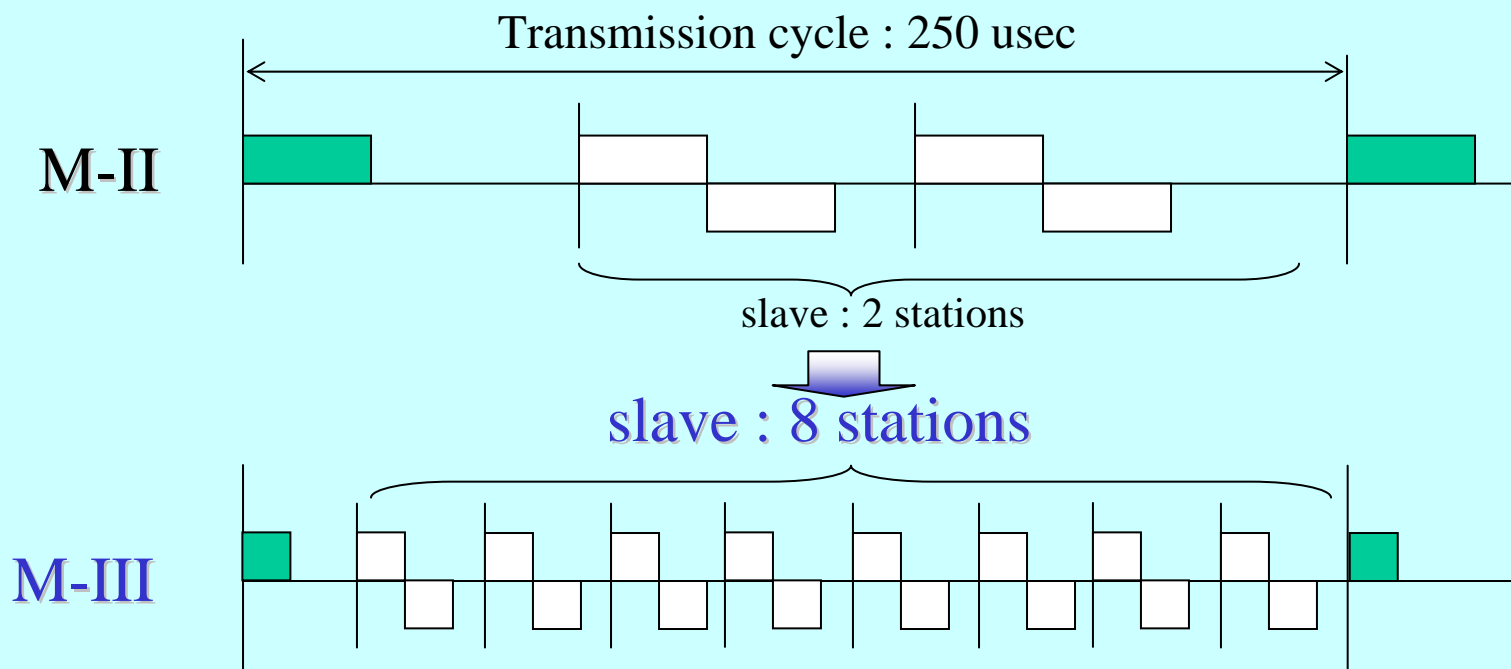


MECHATROLINK-III Features

(1) Speed-up of communication rate

- The transmission rate is sped up to ten times compared to MECHATROLINK-II. (10Mbps -> 100Mbps)
- Industry-leading levels of high-speed cyclic transmission rate (max. 31.25usec)
- It is possible to communicate with more slave stations in the same timeframe as M-II.
[ex. 8 stations / 250 usec, 16 stations / 500 usec]

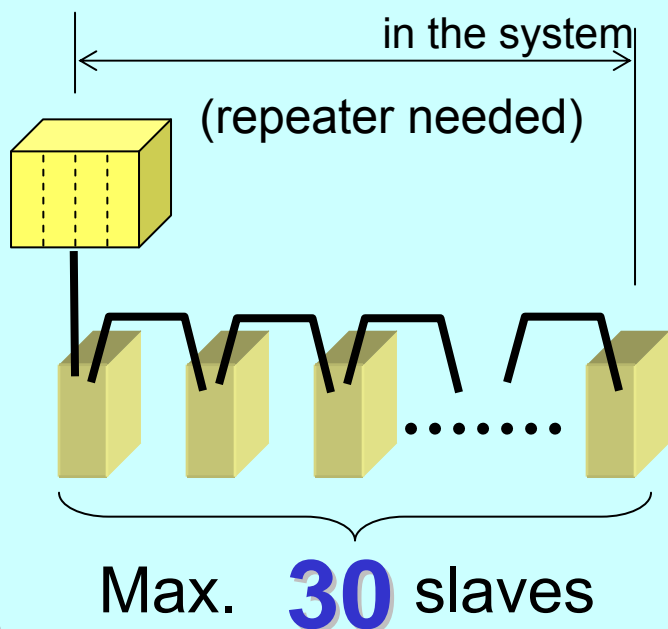
Transmission rate 100Mbps Max cyclic rate 31.25usec



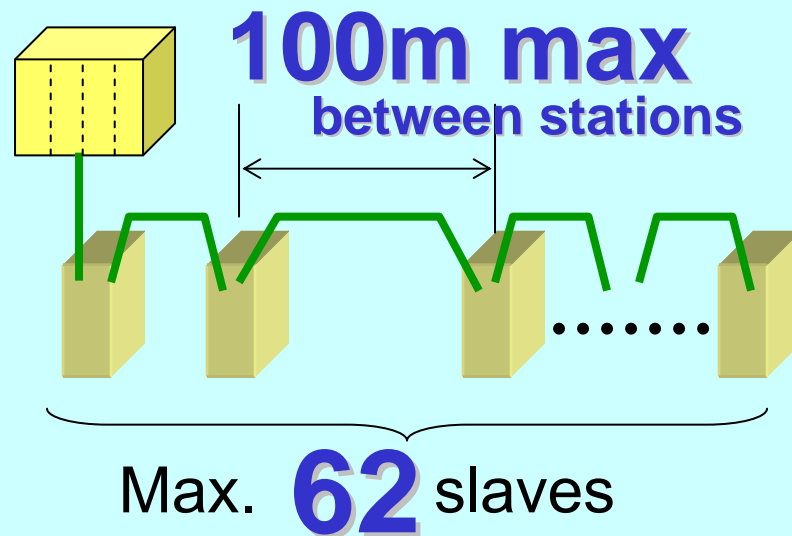
(2) Increasing Applicable systems

- The Maximum number of stations is expanded to 62 stations (twice that of M-II).
- The length between stations will get longer than M-II. Maximum 100m in M-III

■ MECHATROLINK-II 100m max



■ MECHATROLINK-III

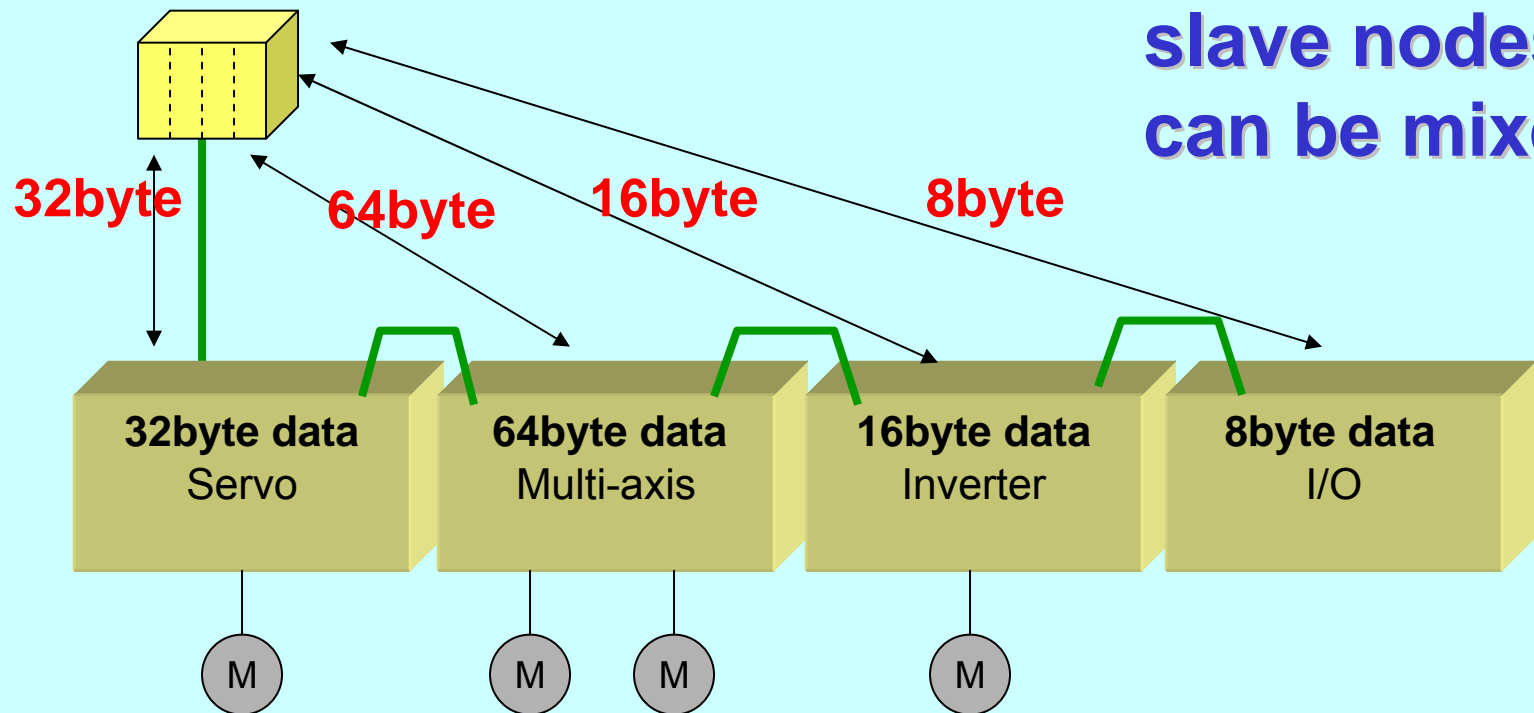


(3) Data size can be mixed

- Newly added Event-driven communication.
- Different communication data size for each slave can be mixed [8 / 16 / 32 / 48 / 64 bytes]

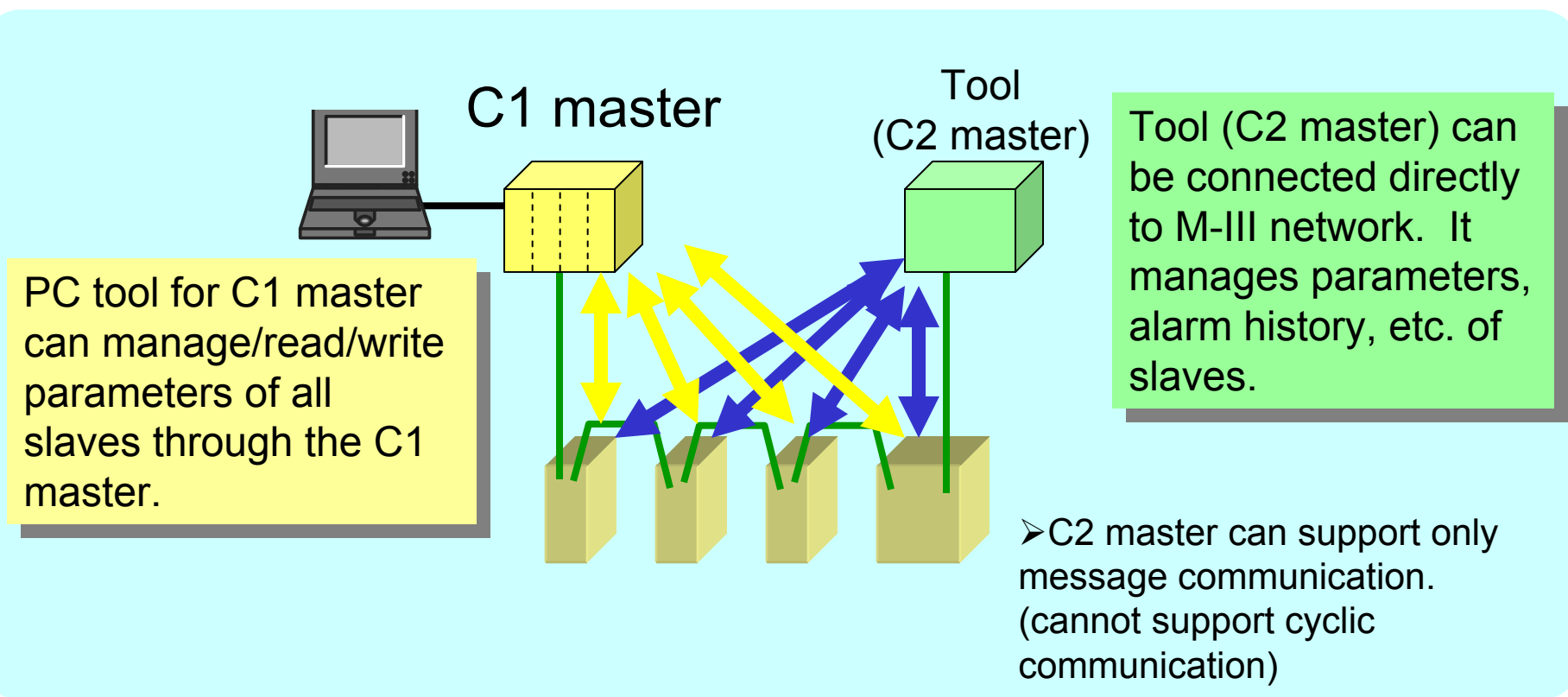
MECHATROLINK-III controller (master)

**Data size of
slave nodes
can be mixed**



(4) Support Message command

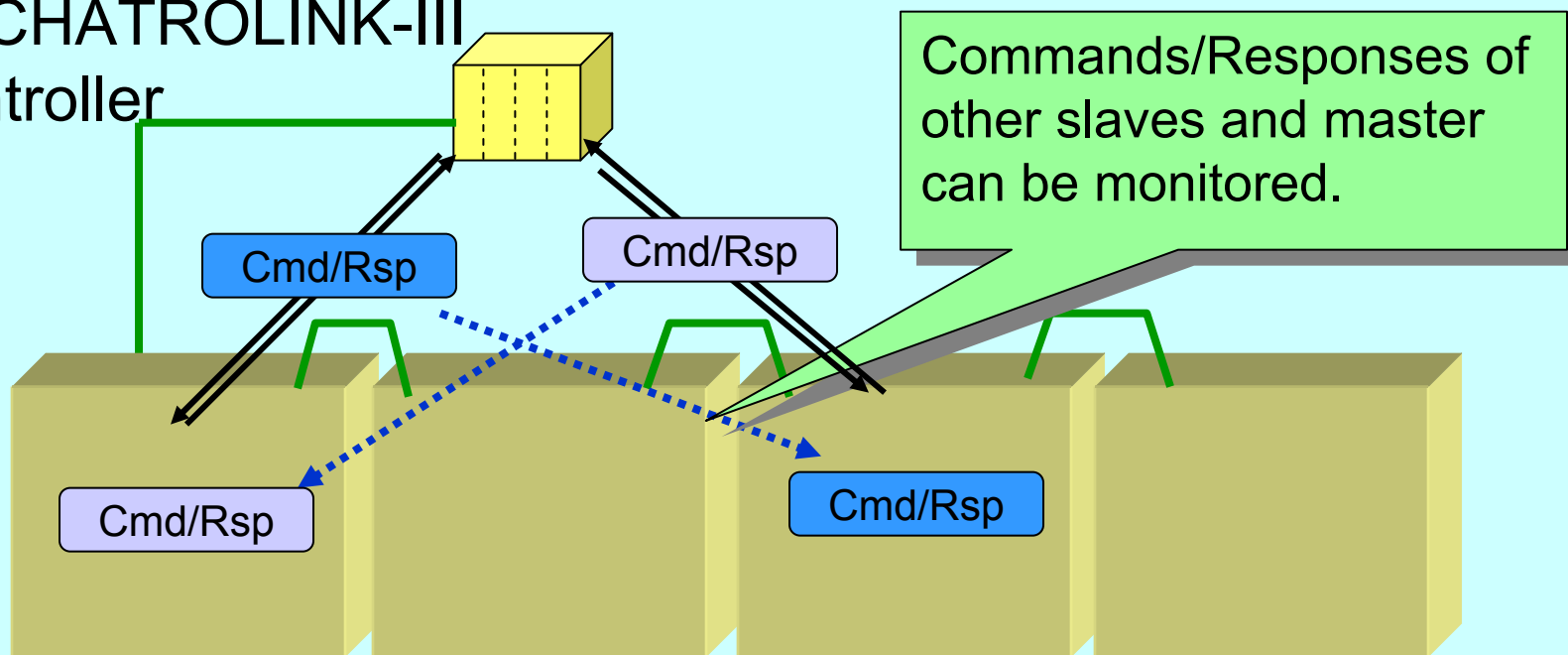
- Possible to get/set the setting data of each slave station using the Message command. Support tool can be realized.



(5) Slave Monitoring

- Slave devices are able to monitor the communication data between the Master and another slave station. Slaves can be developed that decide the next behavior according to another slave's status (i.e. alarm code, PSET signal).

MECHATROLINK-III
Controller

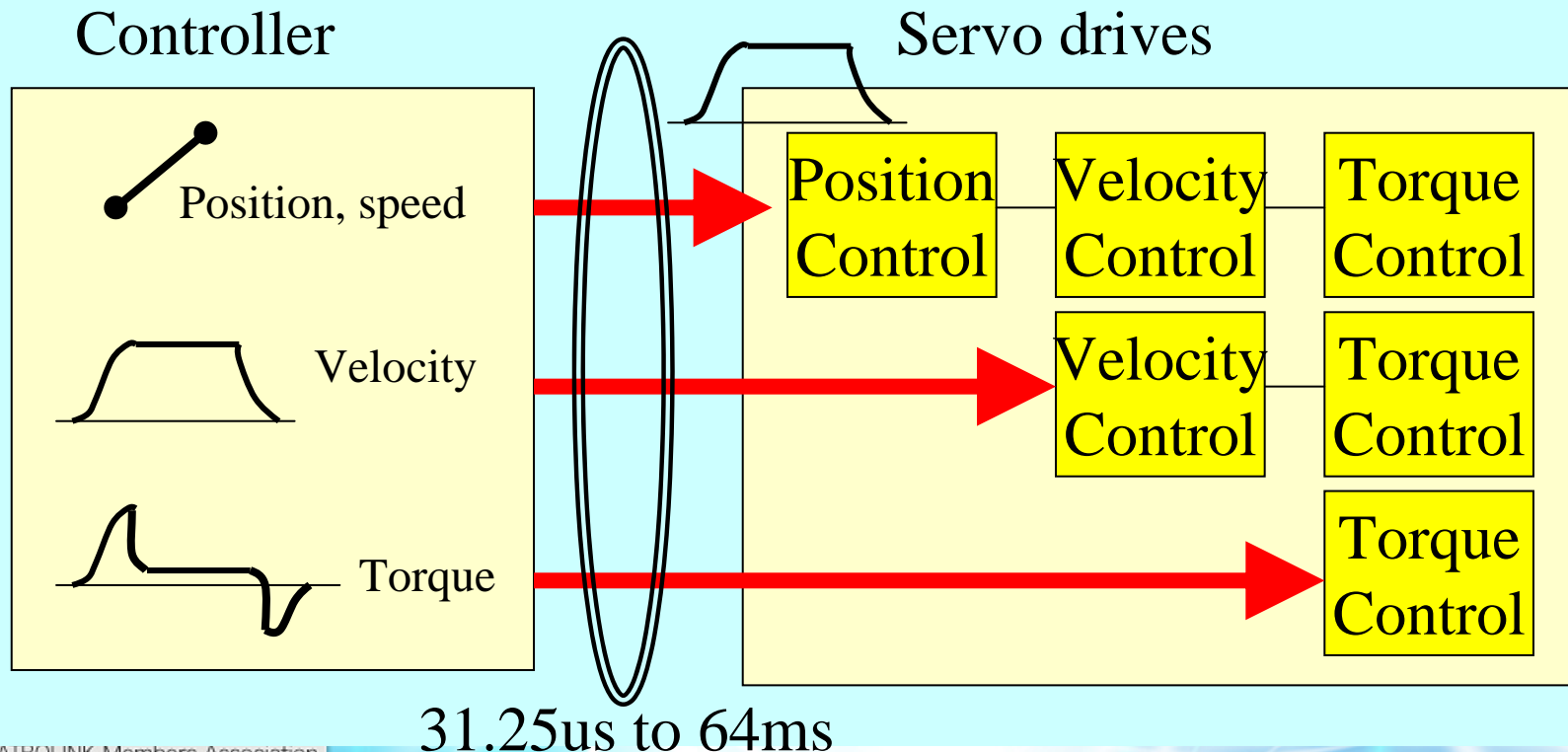


MECHATROLINK-III Slaves

(6) Selectable Servo interface

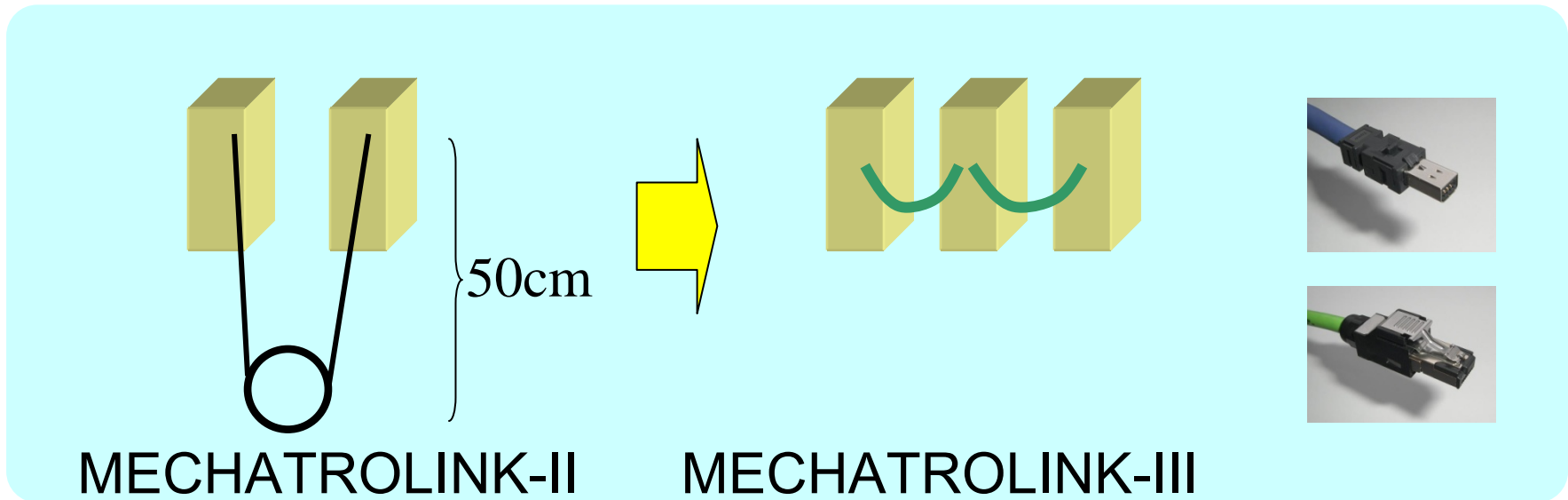
- For MECHATROLINK, the Servo interface from the controller can be selected from 3 options. The best Servo interface can be used depending on the master controller software algorithm.

Selectable



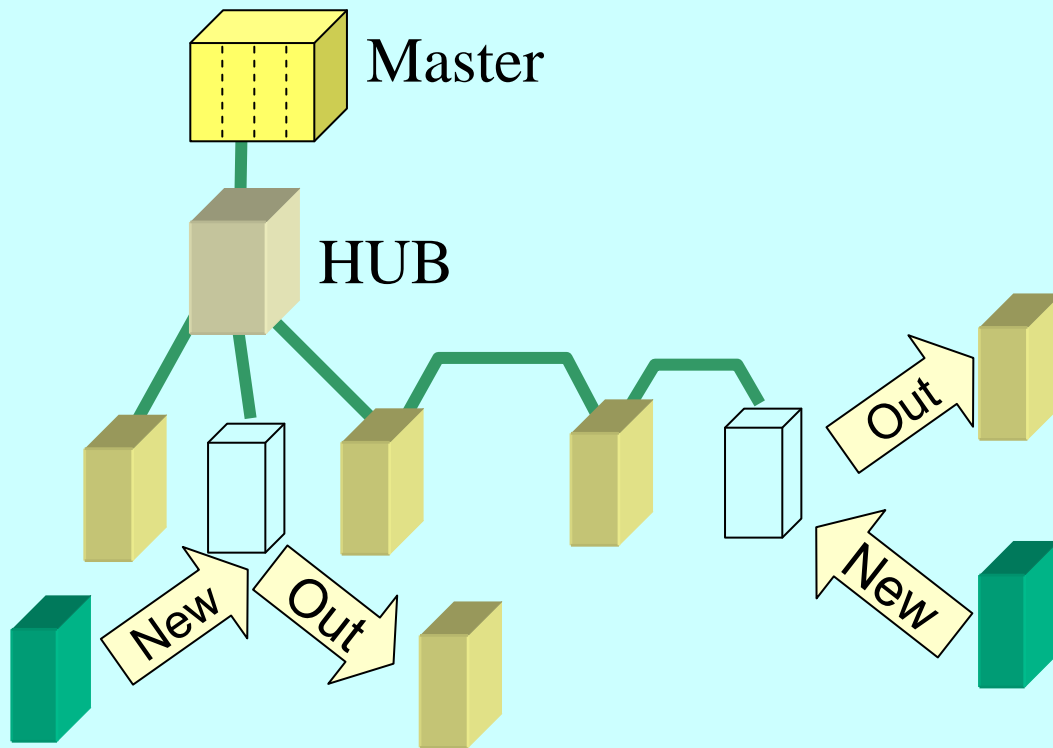
(7) Ethernet technology

–M-III applies Ethernet technology. STP Cat5e cable and RJ-45 can be used. Improves availability and cost. Small compact-type connector also available.



(8) Hot plug support

- MECHATROLINK-III can support Hot plug. Slave device can be exchange during online state.

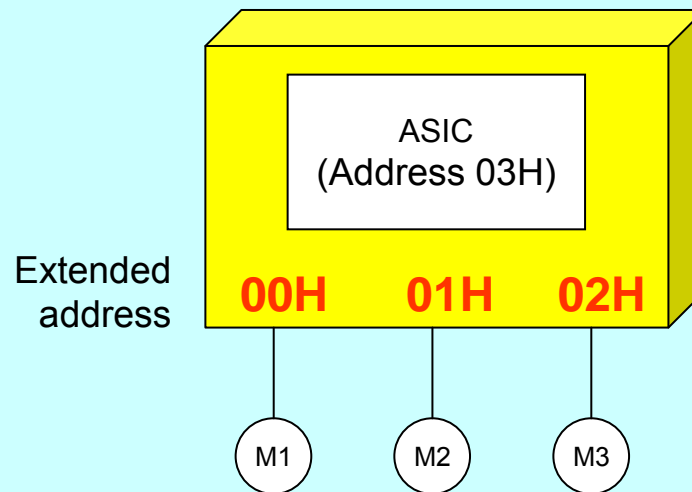


Exchange slave device during running.

(9) Extended Address

–One ASIC chip is able to control multiple slave nodes. It is easy to make a multi axis servo drive or stepping motor drive.

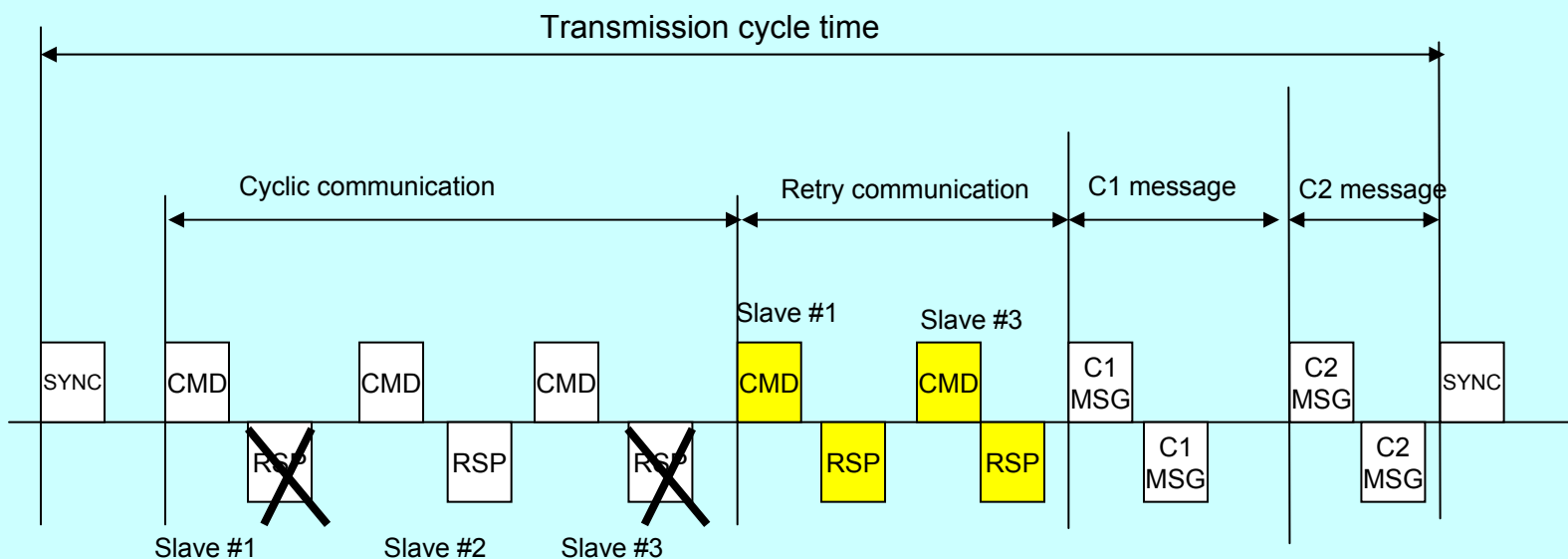
Example. 3 axis servo



Each motor's address from master **0003H 0103H 0203H**

(10)Data reliability

–ASIC has a retry function. Communication data is always robust and reliable even. No necessary to make ring topology.



ASIC automatically detect a communication error and do retry communication with the error node.

MECHATROLINK-III Hardware

- ▶ **MECHATROLINK-III Communication ASIC**
 - ▶ Physical layer : 100 base-TX
- ▶ **Cable**
Category 5 / STP (Shielded Twist Pair)
- ▶ **Connector**
RJ-45 or Industrial mini I/O connector



M-III
cable



RJ-45



Industrial mini
connector

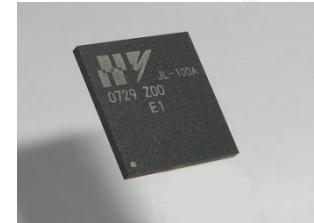
ASIC packages

MECHATROLINK-III Master/Slave ASIC package

Package : FBGA JL-100

Size : 12 mm x 12mm

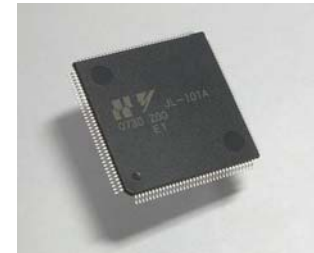
Pins : 144 pin



Package : LQFP JL-101

Size : 20 mm x 20mm

Pins : 144 pin

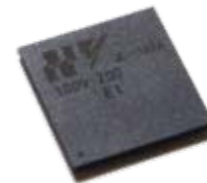


MECHATROLINK-III Slave ASIC package

Package : FBGA JL-102

Size : 12 mm x 12mm

Pins : 144 pin



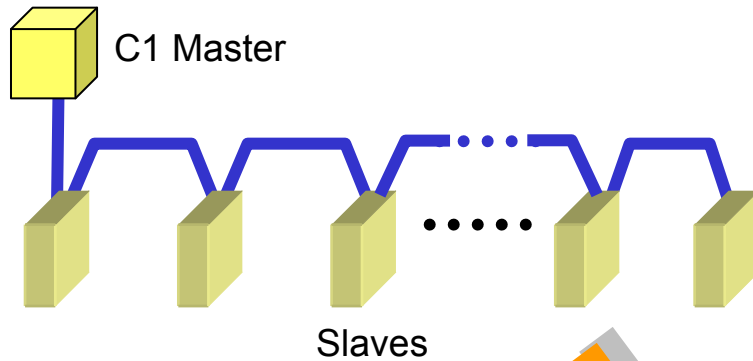
Package : LQFP JL-103

Size : 14 mm x 14mm

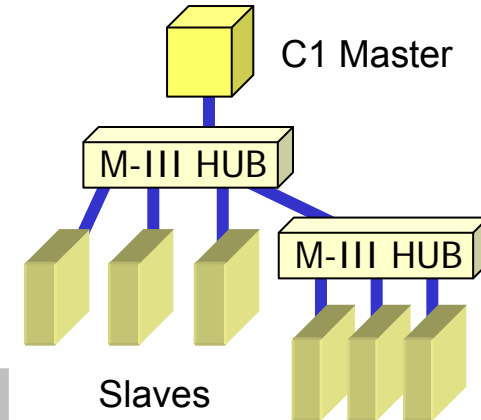
Pins : 100 pin



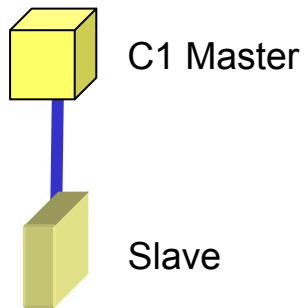
Cascade



Star

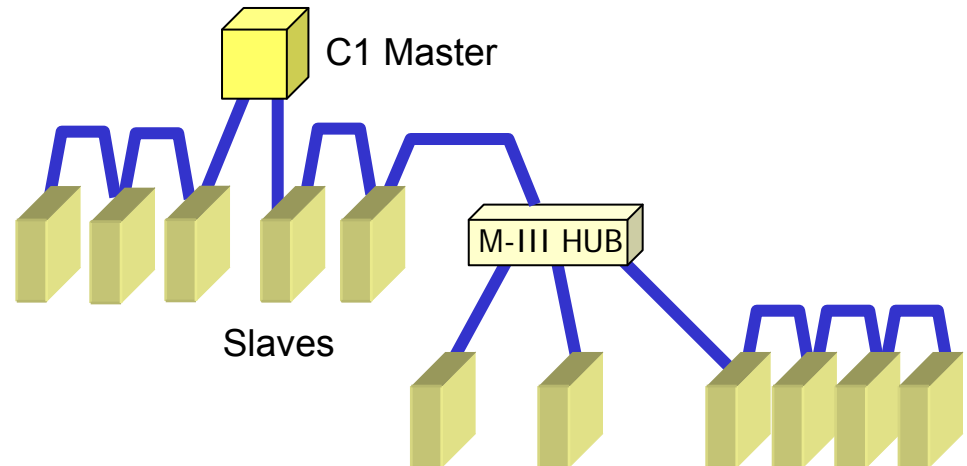


Point to Point



One master and One slave

Star & Cascade mix

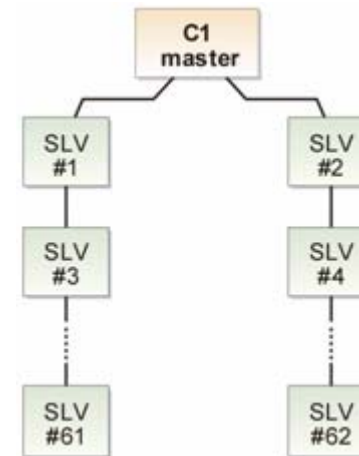


Transmission cycle and station number

Number of slaves in different cable length, data size and transmission cycle.

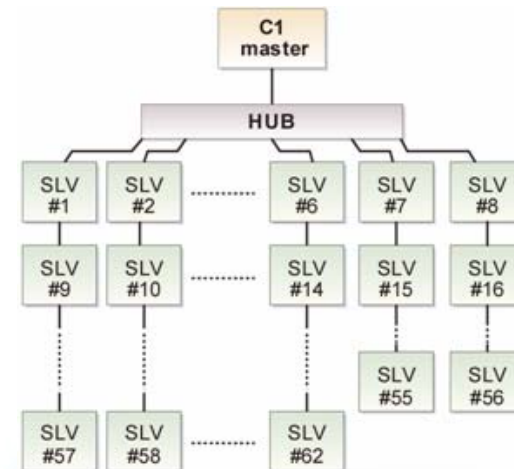
Transmission Cycle	Data size (byte)			
	16	32	48	64
31.25us	1	1	0	0
62.5us	2	2	2	2
125us	6	6	5	4
250us	11	11	10	9
500us	19	19	18	17
1ms	31	31	29	28
2ms	49	49	47	45
4ms	62	62	62	62
8ms	62	62	62	62

Cascade (each cable length : 0.2m)



Transmission Cycle	Data size (byte)			
	16	32	48	64
31.25us	0	0	0	0
62.5us	2	2	2	2
125us	6	6	5	4
250us	12	12	11	10
500us	24	24	21	19
1ms	42	42	39	36
2ms	62	62	62	62
4ms	62	62	62	62
8ms	62	62	62	62

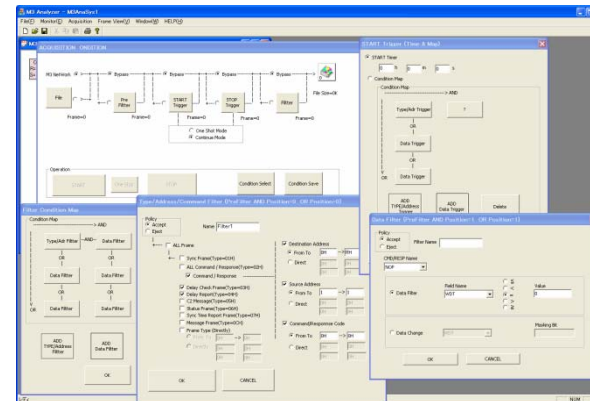
Star (each cable length : 0.2m)



Development tools

Network analyzer

Possible to monitor the data on the network and set the trigger points by placing this unit in the MECHATROLINK-III network. PCMCIA type and PCI type available.



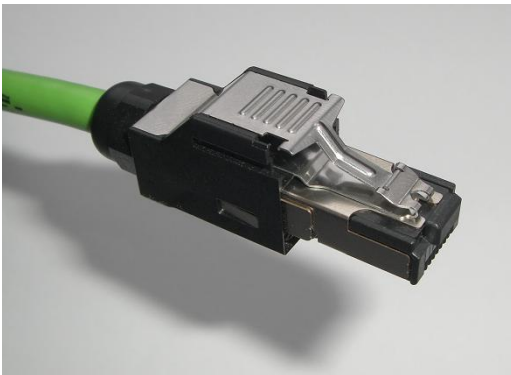
SKYLiNK

Mail: info@sky-link.jp

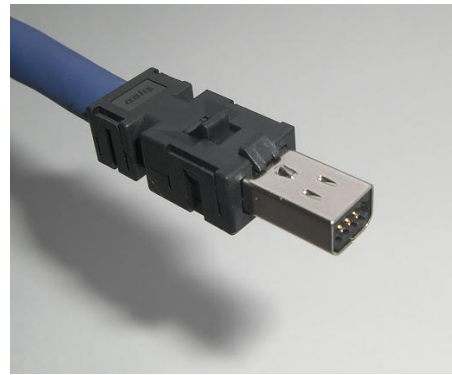
WEB: www.eky-link.jp

Preparing 2 types of cables. One is an Ethernet cable with FA spec RJ-45 connectors. The other is an Ethernet cable with small-type connectors.

To accelerate the openness of MECHATROLINK cables, the connector kit and cable will be prepared.



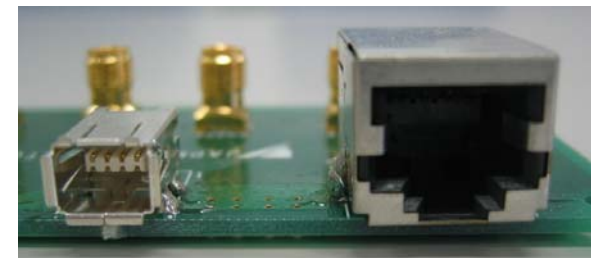
RJ-45



Industrial mini
I/O connector



Cable

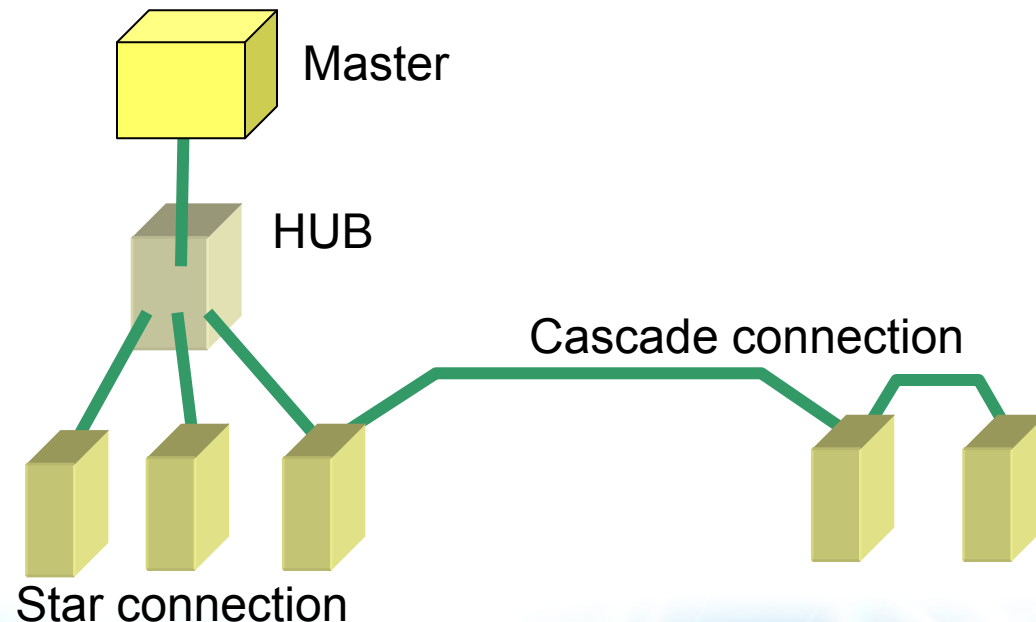


Board side connectors

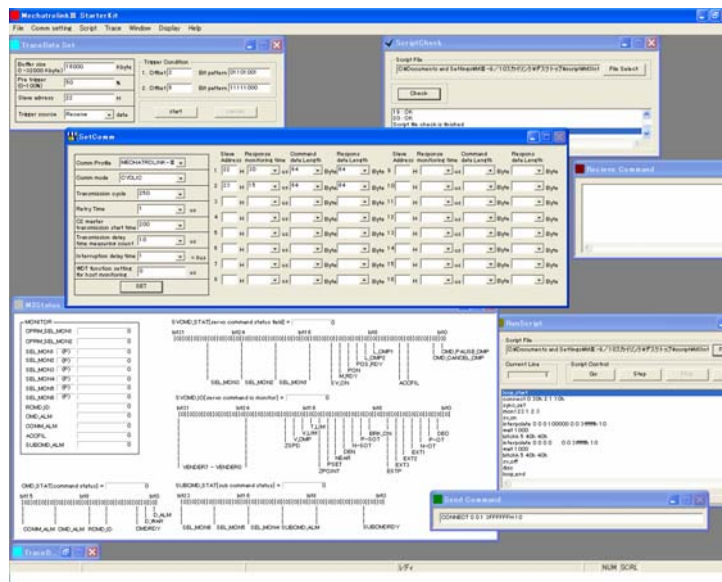
In order to have more flexible system configurations, the exclusive-use HUB for MECHATROLINK-III to make a star connection is being prepared. A cascade and star connection can be mixed. Easy maintenance at device failure etc. is realizable. One master connection and a maximum of eight slave devices can be connected.



MECHATROLINK-III
HUB



The Starter Kit is a convenient tool when developing MECHATROLINK-III slave devices. It consists of a PCI board and Windows software, and a free command can be published by MECHATROLINK-III.



SKYLiNK

Mail: info@sky-link.jp

WEB: www.eky-link.jp

The Sample Kit for members who develop master and slave product PCBs. MECHATROLINK standard circuit composition parts are in one box.

5 parts of each: MECHATROLINK-III ASIC, Ethernet PHY, Pulse transformer, Crystal, and Connector. It can be used only for evaluation products.




JEPMC-OPM3SK-1-E : JL-100

JEPMC-OPM3SK-2-E : JL-101

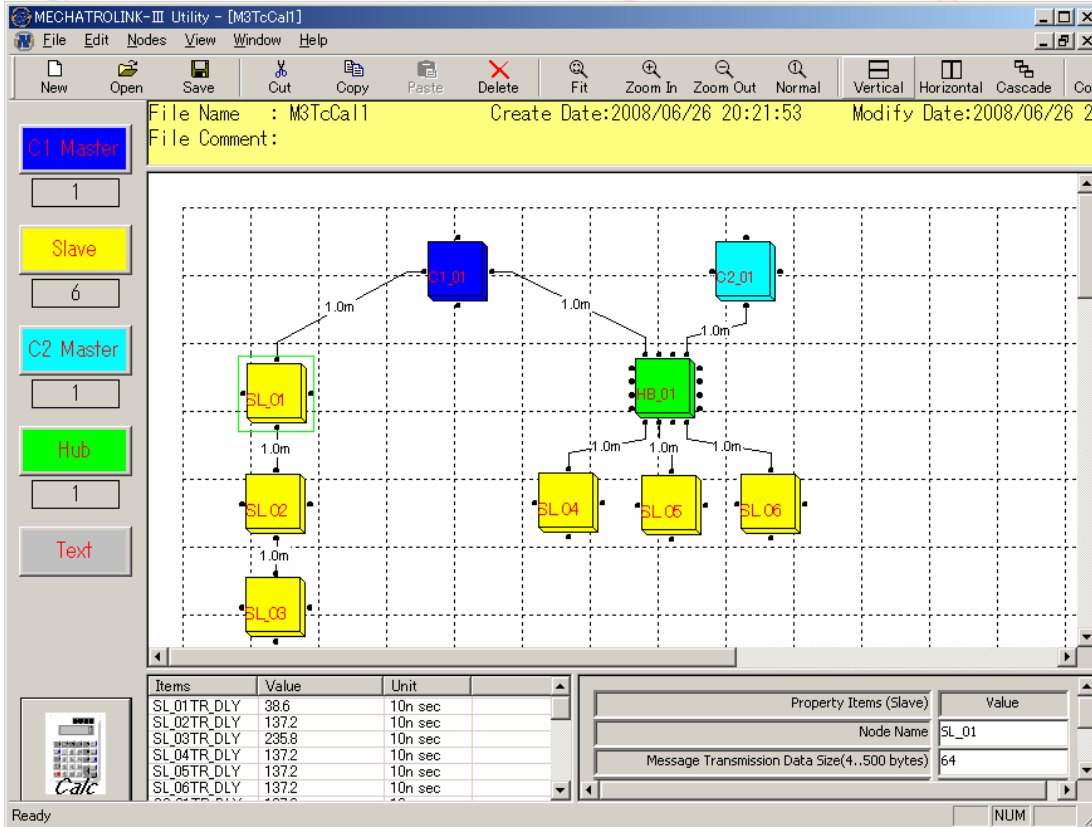
JEPMC-OPM3SK-3-E : JL-102

JEPMC-OPM3SK-4-E : JL-103

The MECHATROLINK-III PCI communication card and a Windows driver are being prepared. It can be used for MECHATROLINK-III communication evaluation and/or evaluation for controlling slave devices from a PC.

<p>[standard PCI] JAPMC-NT112A-E</p>	<ul style="list-style-type: none">•For Master developer•M-III I/F with JL-101 (no CPU)•OS<ul style="list-style-type: none">-Windows + RTX 6.0.1-Windows2000/XP/Vista-Windows + Intime-QNX	
---	--	--

Yaskawa Electric Corp.



The screenshot shows the MECHATROLINK-III Utility software interface. The main window displays a network diagram on a grid. The diagram includes two master nodes (C1_01 and C2_01), one hub node (HB_01), and six slave nodes (SL_01 to SL_06). Connections are labeled with '1.0m'. The interface includes a menu bar (File, Edit, Nodes, View, Window, Help), a toolbar with icons for file operations and editing, and a status bar at the bottom. A sidebar on the left contains buttons for 'C1 Master', 'Slave', 'C2 Master', 'Hub', and 'Text'. A table at the bottom left lists transmission delay items, and a property editor at the bottom right shows settings for a selected slave node.

Items	Value	Unit
SL_01TR_DLY	38.6	10n sec
SL_02TR_DLY	137.2	10n sec
SL_03TR_DLY	235.8	10n sec
SL_04TR_DLY	137.2	10n sec
SL_05TR_DLY	137.2	10n sec
SL_06TR_DLY	137.2	10n sec

Property Items (Slave)	Value
Node Name	SL_01
Message Transmission Data Size(4..500 bytes)	64

System configuration is defined by putting the icons(C1/C2 master, slave, Hub) and connecting them with lines in the canvas and setting the parameters such as communication data size, cable length, retry times, and so on. This software calculates the minimum transmission cycle time in that system.