

eCO-IPC:

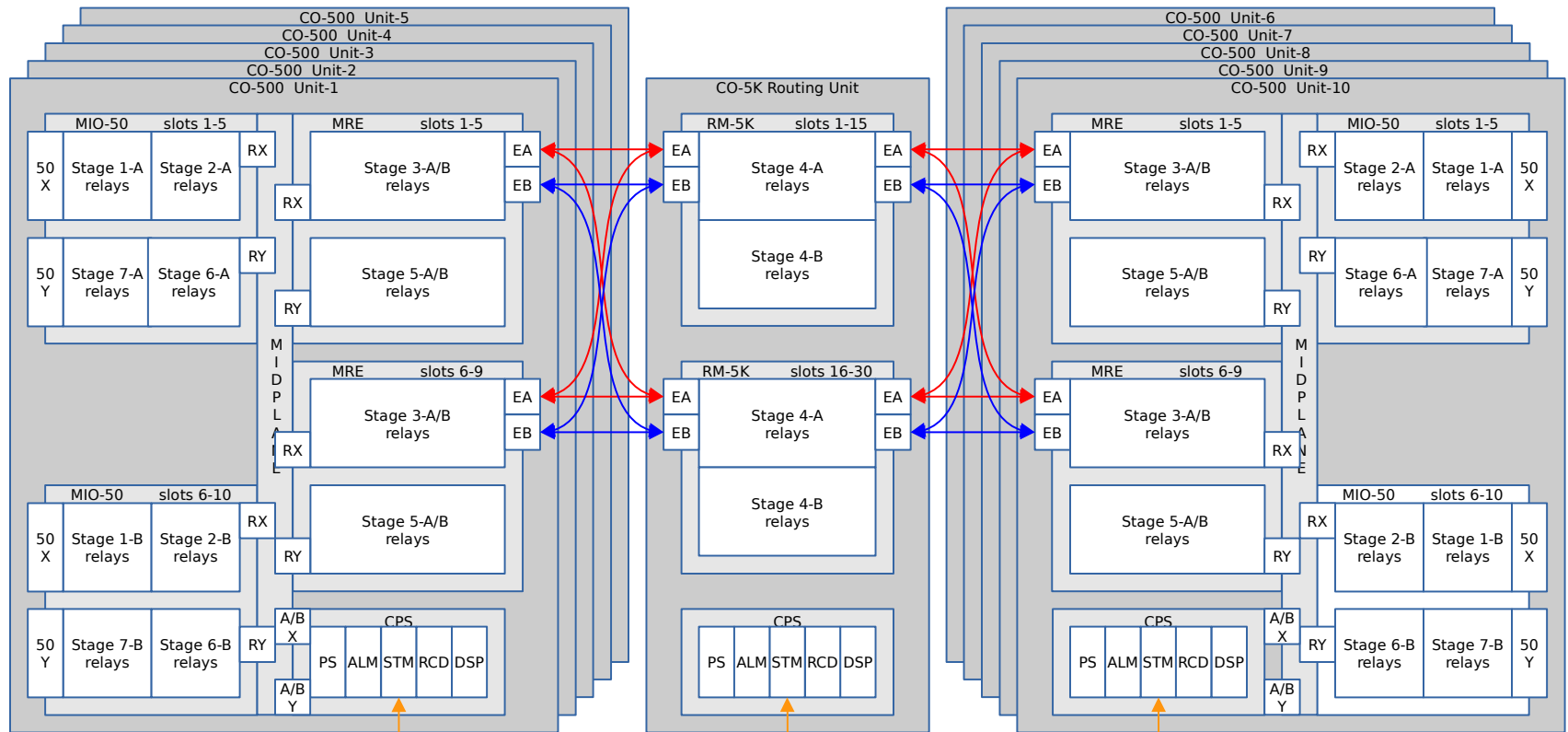
System Design

Summary:

- 1) eCO-IPC (Expandable Central Office – Intelligent Provisioning Center) is an automated distribution frame system designed for configuration, provisioning and maintenance of up to 5,000 cross-connections between its 5,000 X-ports (for cable-pairs) and its 5,000 Y-ports (for office-equipments).
- 2) The system is configured as a star-network of up to 10 CO-500 units inter-connected through 1 CO-Routing unit. Each CO-500 unit supports 500 non-blocking cross-connections between its 500 X-ports and 500 Y-ports located on same unit or on other CO-500 units combined. This configuration supports up to 5,000 cross-connections.
- 3) The CO-500 chassis holds 1 Control & Power Supply card (CPS), 10 Matrix I/O cards (MIO-50) and 9 Matrix Routing & Expansion cards (MRE), all are inter-connected through a Mid-plane (MP).
- 4) Cross-connections between the X-ports and Y-ports are established over a 7-stages matrix of relays. For X-ports and Y-ports in the same CO-500 unit only relays in stages 1, 2, 3, 5, 6 and 7 are used. For X-ports and Y-ports across different CO-500 units relays in all 7 stages are used.
- 5) MIO-50 cards contain relays for stage-1, stage-2, stage-6 and stage-7 of the matrix. MRE cards contain relays for stage-3 and stage-5 of the matrix. The Routing Module cards (RM) residing in CO-Routing unit contains relays for stage-4, which bridge connections between different CO-500 units.
- 6) The CO-Routing chassis holds 1 Control & Power Supply card (CPS) and up to 30 Routing modules (RM), The RM cards contain arrays of relays for bridging the expanding connections between different CO-500 units.
- 7) The CPS houses a power supply, ST Micro Controller module (STM) and Digital Signal Processor (DSP), Alarm Circuitry (ALM) and Relays Coils Drivers (RCD).
- 8) On the CO-500 unit, STM can operate (open/close) individual relays on all MIO-50 and MRE cards. DSP card can detect/generate DTMF, Dial tone test buses and which has accesses to test-buses and provides basic tone detection/generation including DTMF and K-tones.
- 9) On the CO-Routing unit, STM can operate (open/close) individual relays on all RM cards.
- 10) STM has Serial interface connection with an external computer/server where eCO IPC software resides. Using Telepath's proprietary protocol, eCO-IPC software can instruct STM to open/close relays via RCD, to manage alarm via ALM, and to perform maintenance test via DSP.
- 11) Technicians can perform configuration, provisioning and maintenance tasks via Web GUI or TL1 command lines interface provided by eCO-IPC software.

ECO-IPC: Architecture Blocks Diagram

The diagram below shows a 5K CO system configured in a star network of 10 CO-500 units interconnected via 1 CO-5K Routing unit. The Midplane allows RX signals travel from stage-2 to stage-3, RY signals travels from stage-5 to stage-6. Red cables allows EA signals travel between stage-3 & 4. Blue cables allows EB signals travel between stage-3 & 4.



Matrix Cards:

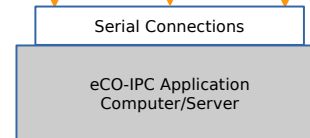
Total Relays:

MIO-50		3000	(10 cards per CO-500 unit)
MRE	100%	2100	(9 cards per CO-500 unit)
MRE	80%	2060	
MRE	60%	2020	
MRE	40%	1980	
MRE	20%	1940	

Matrix Cards:

Total Relays:

RM-1K	2880	(5 cards per CO-1K Routing unit)
RM-5K	3000	(30 cards per CO-5K Routing unit)

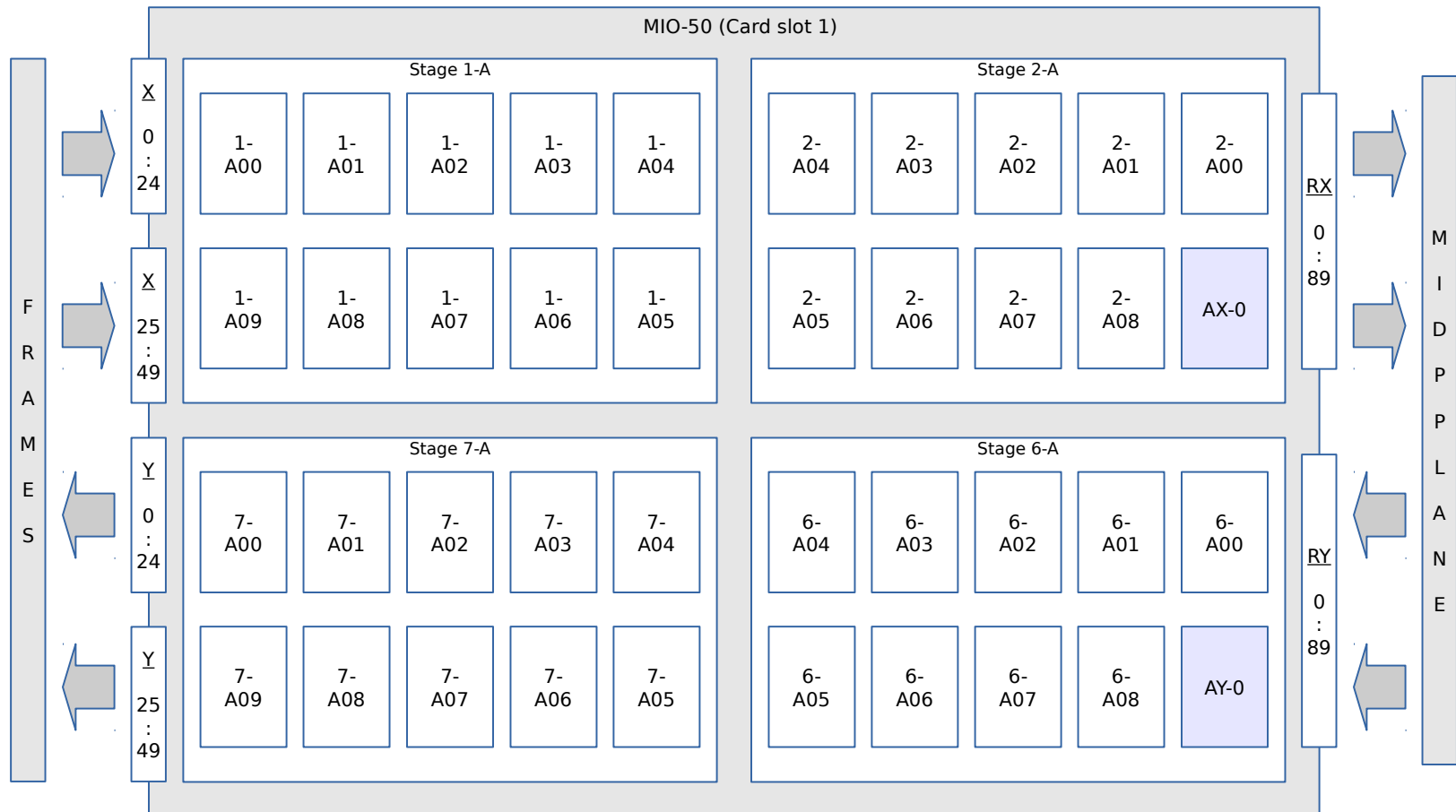


ECO-IPC:

MIO-50 (Slots 1-5)

Each MIO-50 in slots 1-5 contains 40 A-arrays for stages 1, 2, 6 & 7: 10@1-A's, 9@2-A's, 9@6-A's, 10@7-A's.

- **Slot 1:** Arrays 1-A00~1-A09, 2-A00~2-A08, 6-A00~6-A08, 7-A00~7-A09 and AX-0.
- **Slot 2:** Arrays 1-A10~1-A19, 2-A10~2-A18, 6-A10~6-A18, 7-A10~7-A19 and AX-1.
- **Slot 3:** Arrays 1-A20~1-A29, 2-A20~2-A28, 6-A20~6-A28, 7-A20~7-A29 and AX-2.
- **Slot 4:** Arrays 1-A30~1-A39, 2-A30~2-A38, 6-A30~6-A38, 7-A30~7-A39 and AX-3.
- **Slot 5:** Arrays 1-A40~1-A49, 2-A40~2-A48, 6-A40~6-A48, 7-A40~7-A49 and AX-4.
- Array AX is for connecting X-ports to the Test Bus. Array AY is for connecting Y-ports to the Test Bus



ECO-IPC:

MIO-50 (Slots 6-10)

Each MIO-50 in slots 6-10 contains 40 B-arrays for stages 1, 2, 6 & 7: 10@1-B's, 9@2-B's, 9@6-B's, 10@7-B's.

- Slot 6: Arrays 1-B00~1-B09, 2-B00~2-B08, 6-B00~6-B08, 7-B00~7-B09 and BX-0.
- Slot 7: Arrays 1-B10~1-B19, 2-B10~2-B18, 6-B10~6-B18, 7-B10~7-B19 and BX-1.
- Slot 8: Arrays 1-B20~1-B29, 2-B20~2-B28, 6-B20~6-B28, 7-B20~7-B29 and BX-2.
- Slot 9: Arrays 1-B30~1-B39, 2-B30~2-B38, 6-B30~6-B38, 7-B30~7-B39 and BX-3.
- Slot 10: Arrays 1-B40~1-B49, 2-B40~2-B48, 6-B40~6-B48, 7-B40~7-B49 and BX-4.
- Array BX is for connecting X-ports to the Test Bus. Array BY is for connecting Y-ports to the Test Bus.



eCO-IPC:

Arrays of relays for stage-3 & 5 on MRE cards

Each MRE card (Rear Slots 1, 2, 3, 4, 5, 6, 7, 8, 9) contains 50 3-A, 50 3-B, 10 5-A and 10 5-B arrays:

- Slot 1: 3-A/B 00~09, 100~109, 200~209, 300~309, 400~409 and 5-A/B 00~09.
- Slot 2: 3-A/B 10~19, 110~119, 210~219, 310~319, 410~419 and 5-A/B 10~19.
- Slot 3: 3-A/B 20~29, 120~129, 220~229, 320~329, 420~429 and 5-A/B 20~29.
- Slot 4: 3-A/B 30~39, 130~139, 230~239, 330~339, 430~439 and 5-A/B 30~39.
- Slot 5: 3-A/B 40~49, 140~149, 240~249, 340~349, 440~449 and 5-A/B 40~49.
- Slot 6: 3-A/B 50~59, 150~159, 200~259, 350~359, 450~459 and 5-A/B 50~59.
- Slot 7: 3-A/B 60~69, 160~169, 260~269, 360~369, 460~469 and 5-A/B 60~69.
- Slot 8: 3-A/B 70~79, 170~179, 270~279, 370~379, 470~479 and 5-A/B 70~79.
- Slot 9: 3-A/B 80~89, 180~189, 280~289, 380~389, 480~489 and 5-A/B 80~89.

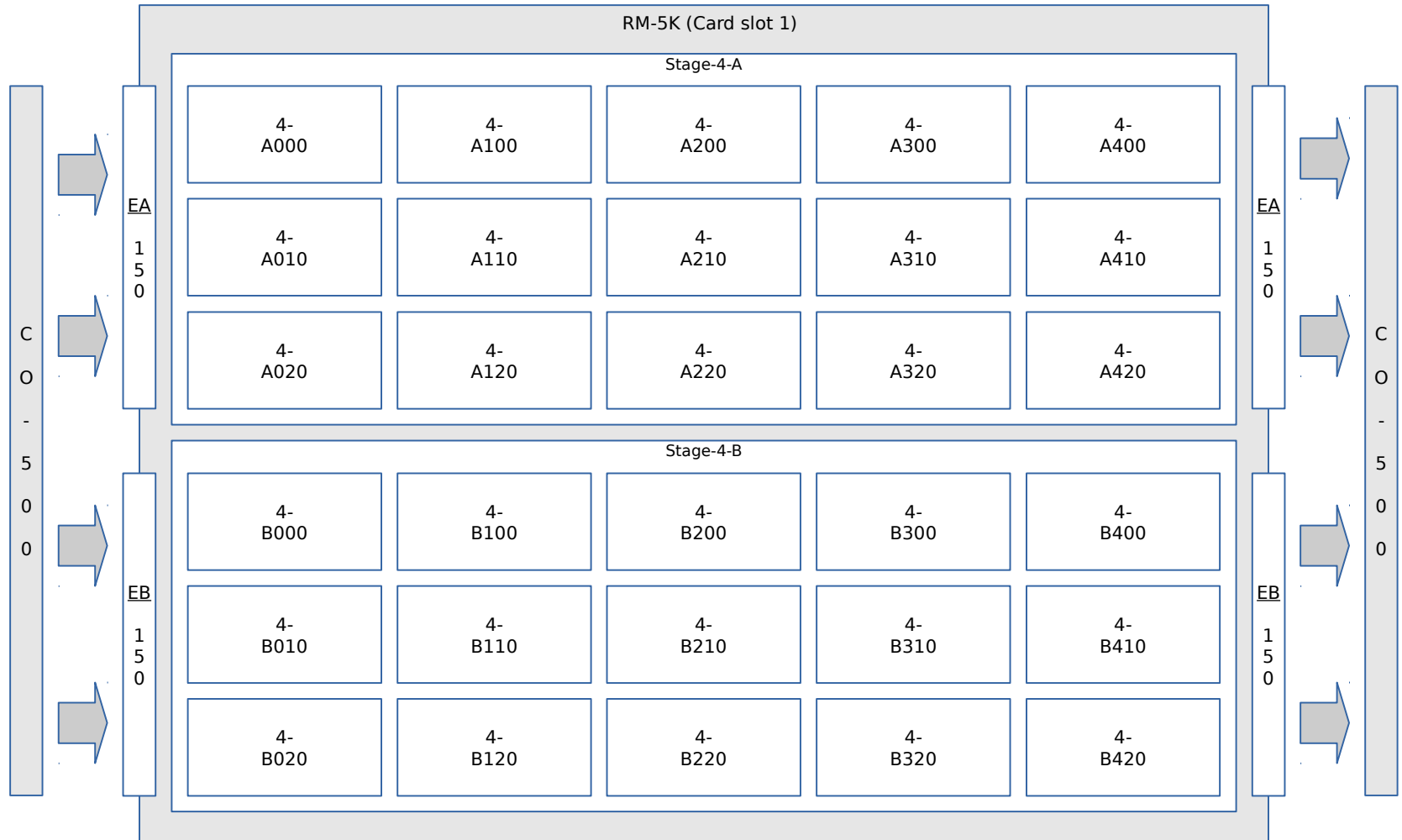


eCO-IPC:

Arrays of relays for stage-4 on RM-5K card slot 1

Each RM-5K card contains 15 4-A and 15 4-B arrays:

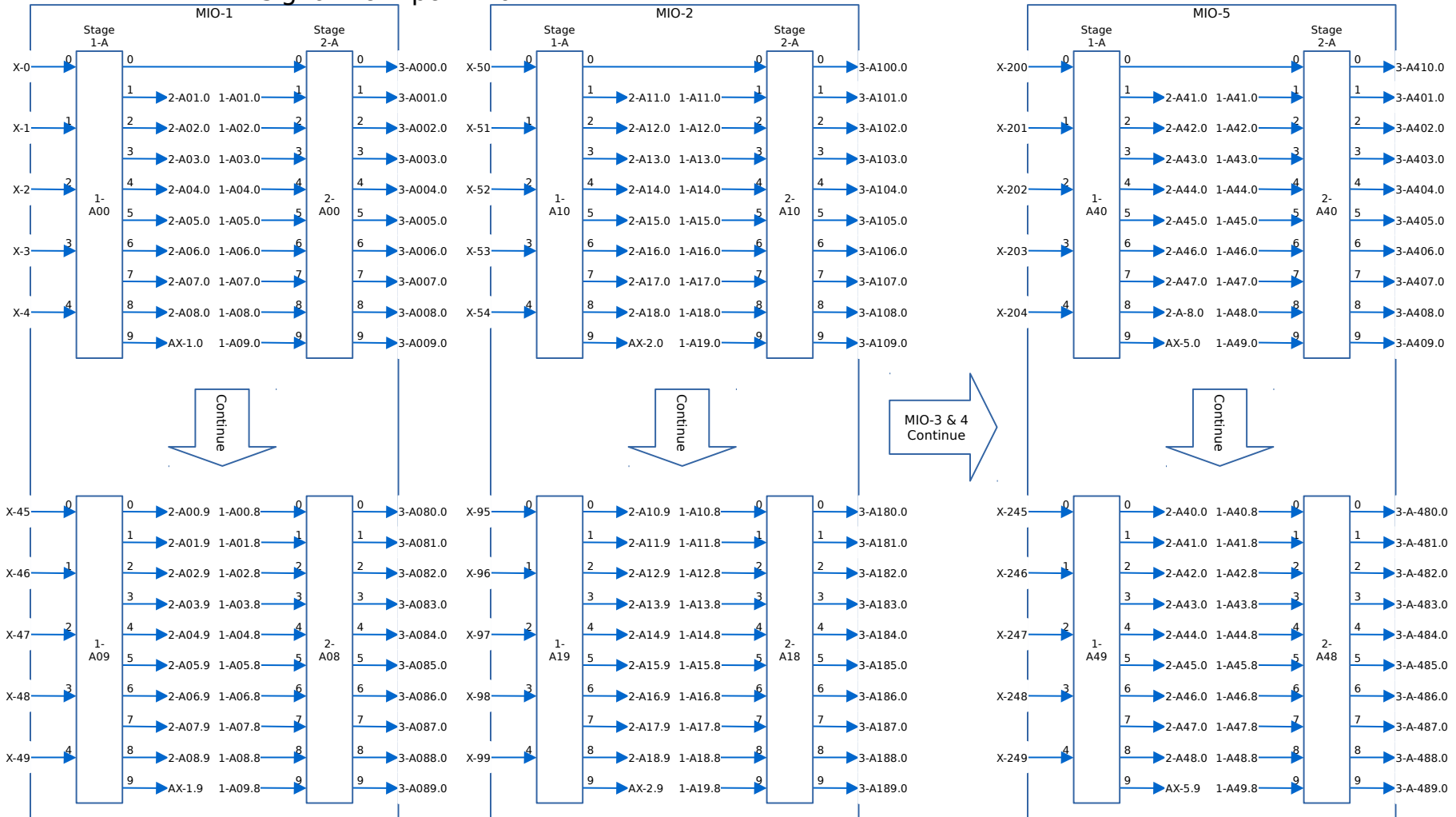
- Slot 1: 000~400, 010~410, 020~420. Slot 4: 001~401, 011~411, 021~421. Slot 28: 009~409, 019~419, 029~429.
- Slot 2: 030~430, 040~440, 050~450. Slot 5: 031~431, 041~441, 051~451. Slot 29: 039~439, 049~449, 059~459.
- Slot 3: 060~460, 070~470, 080~480. Slot 6: 061~461, 071~471, 081~481. Slot 30: 069~469, 079~479, 089~489.



eCO-IPC:

Ex: 2-A08.9 signal to stage 2, array A08, input index 9.

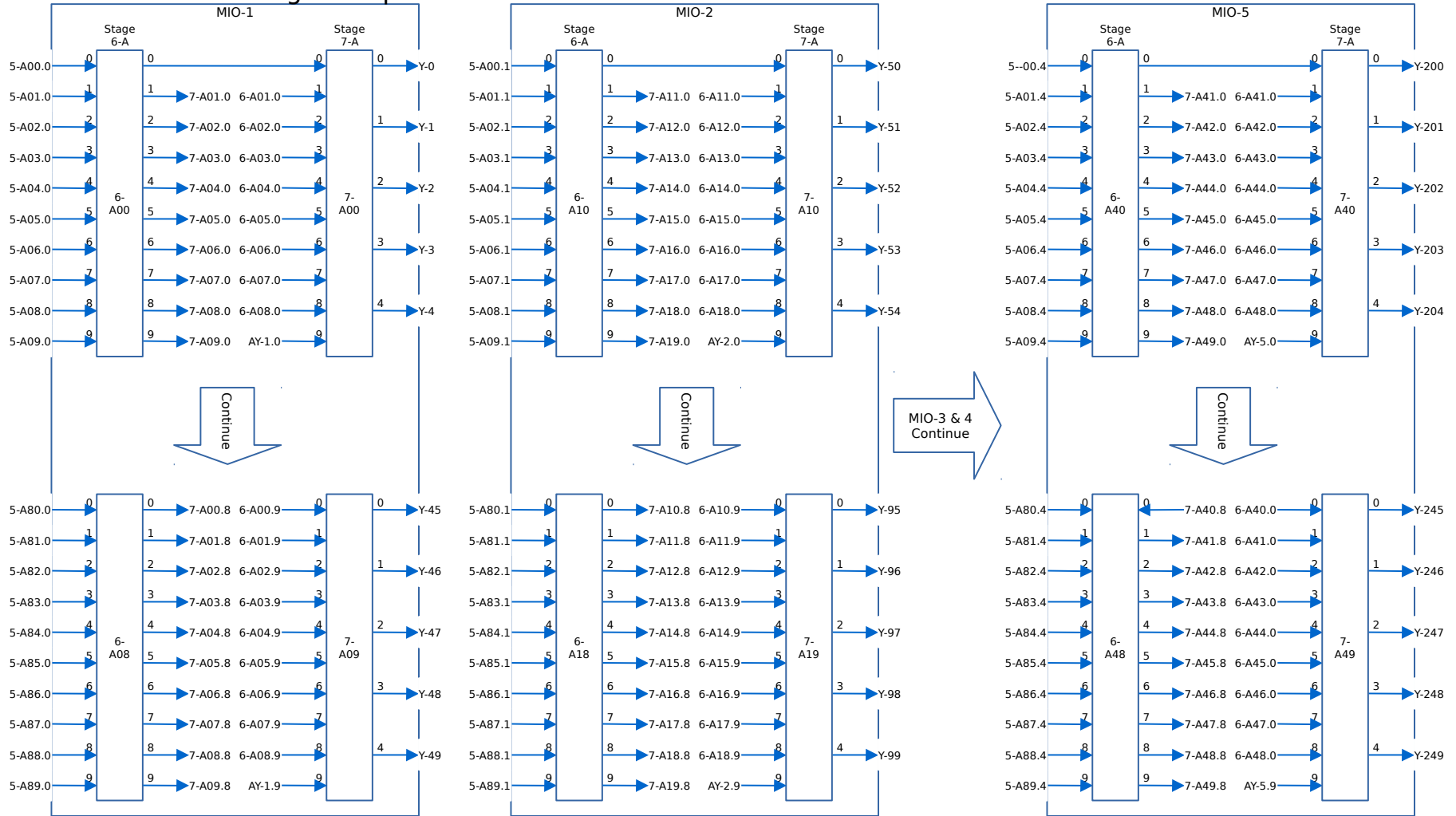
Ex: X-0 \rightarrow signal from port X-0.



eCO-IPC:

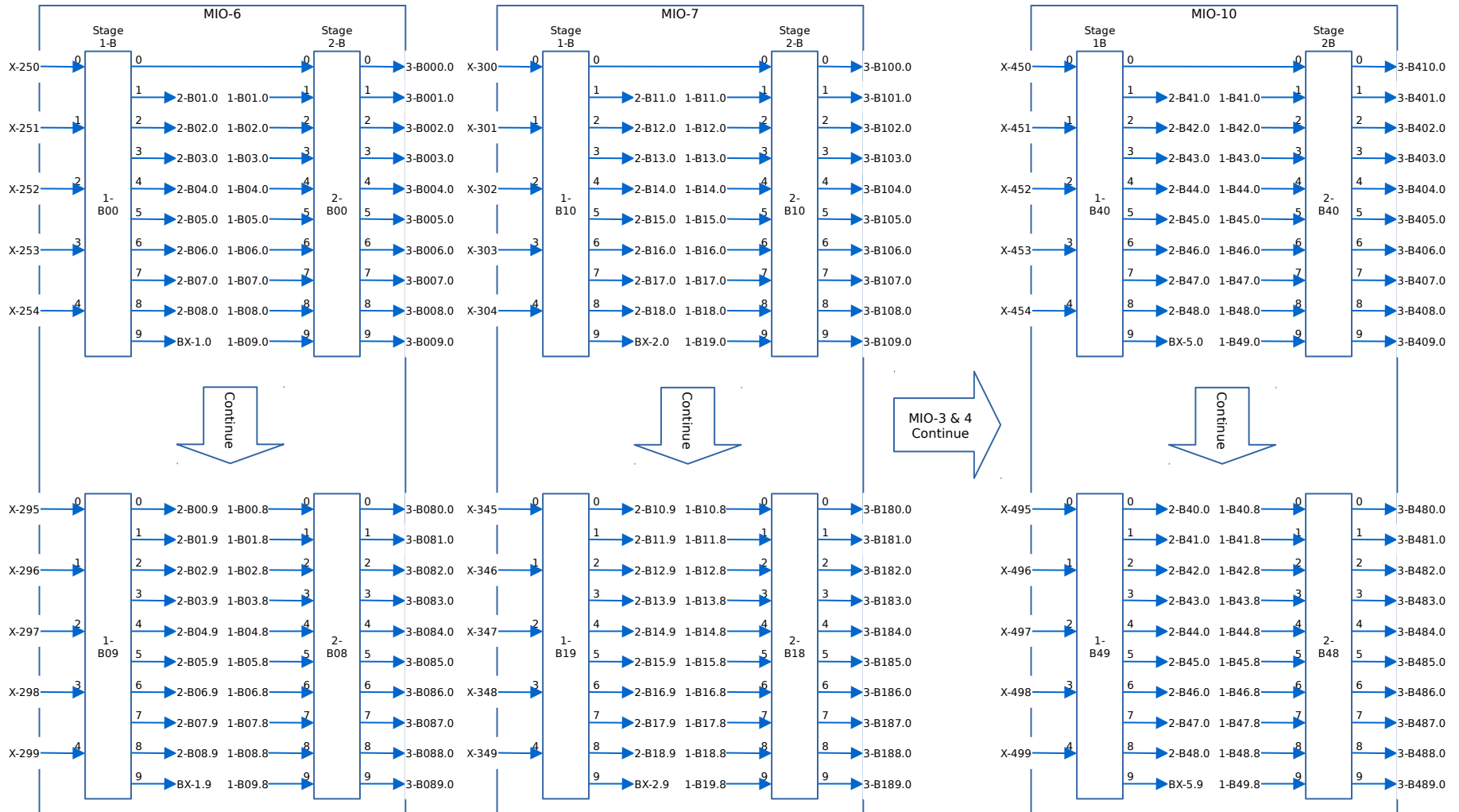
Inter-connections between stages 6 & 7 in the top 5 MIO-50 slots

Ex: 7-A02.8 → signal from stage-7, array A02, output index 8.
 Ex: → 6-A04.9 signal to stage-6, array A04, input index 9.
 Ex: → Y-50 signal to port Y-50



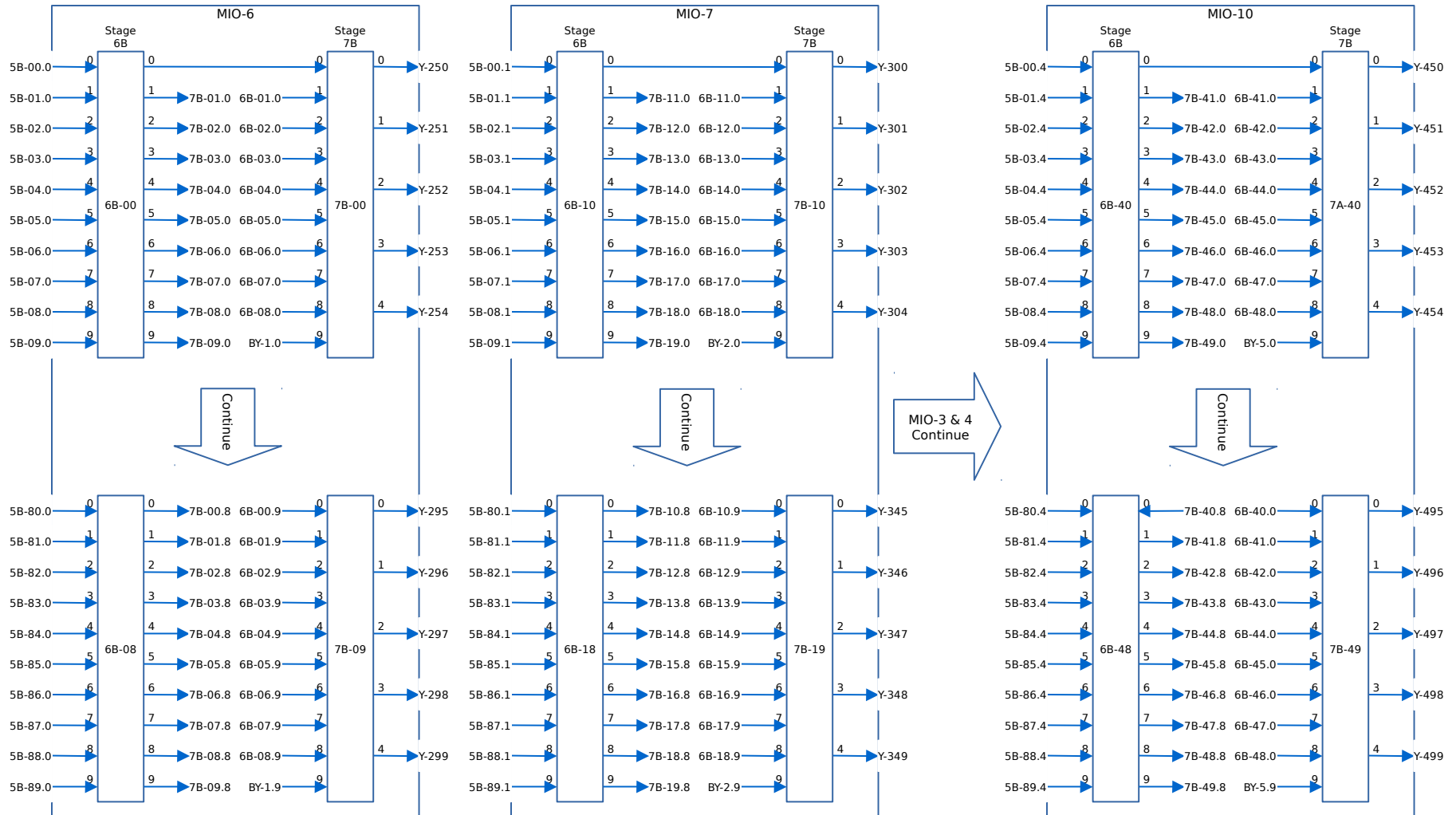
eCO-IPC:

Inter-connections between stages 1 & 2 in the bottom 5 MIO-50 slots



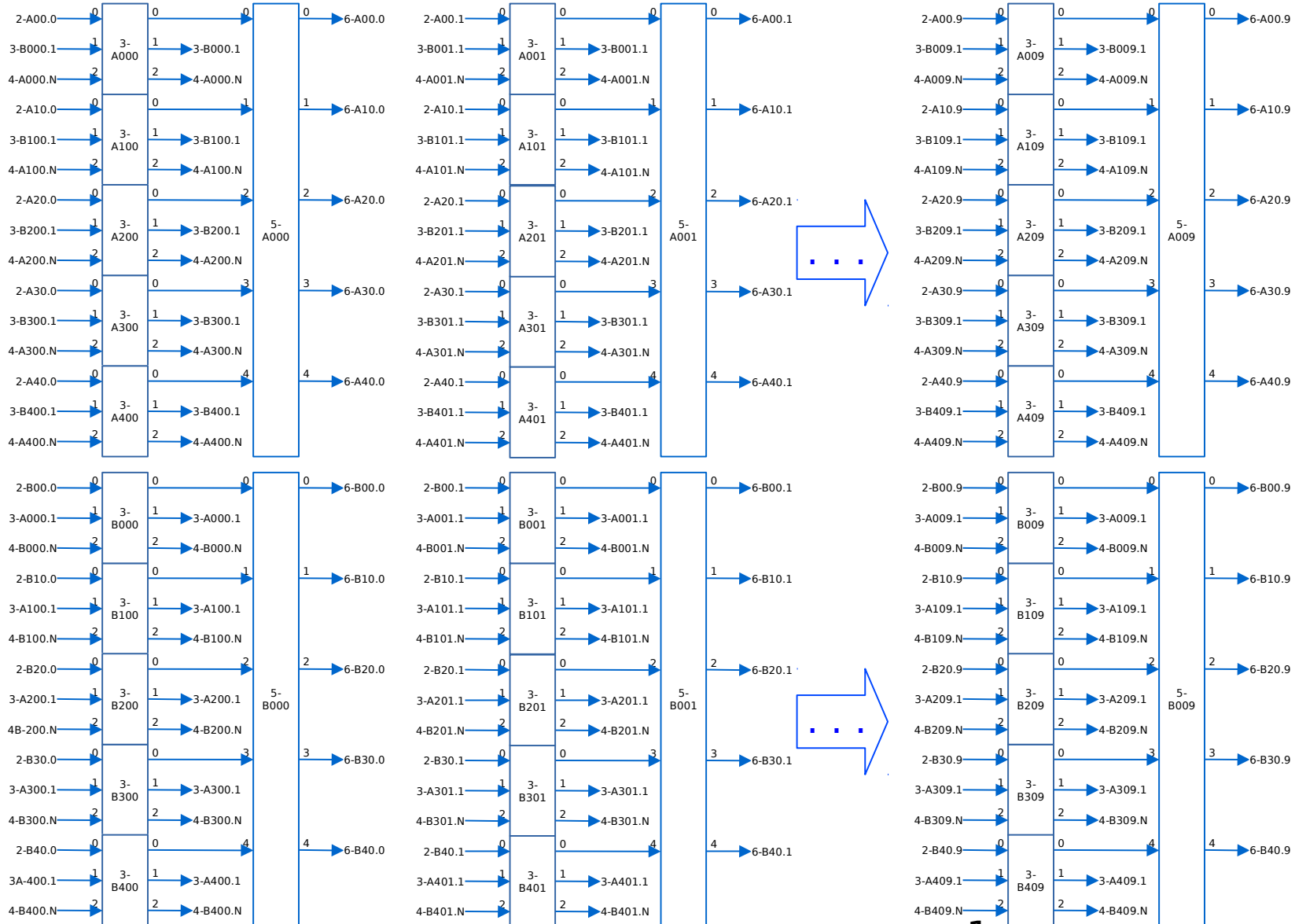
eCO-IPC:

Inter-connections between stages 6 & 7 in the bottom 5 MIO-50 slots



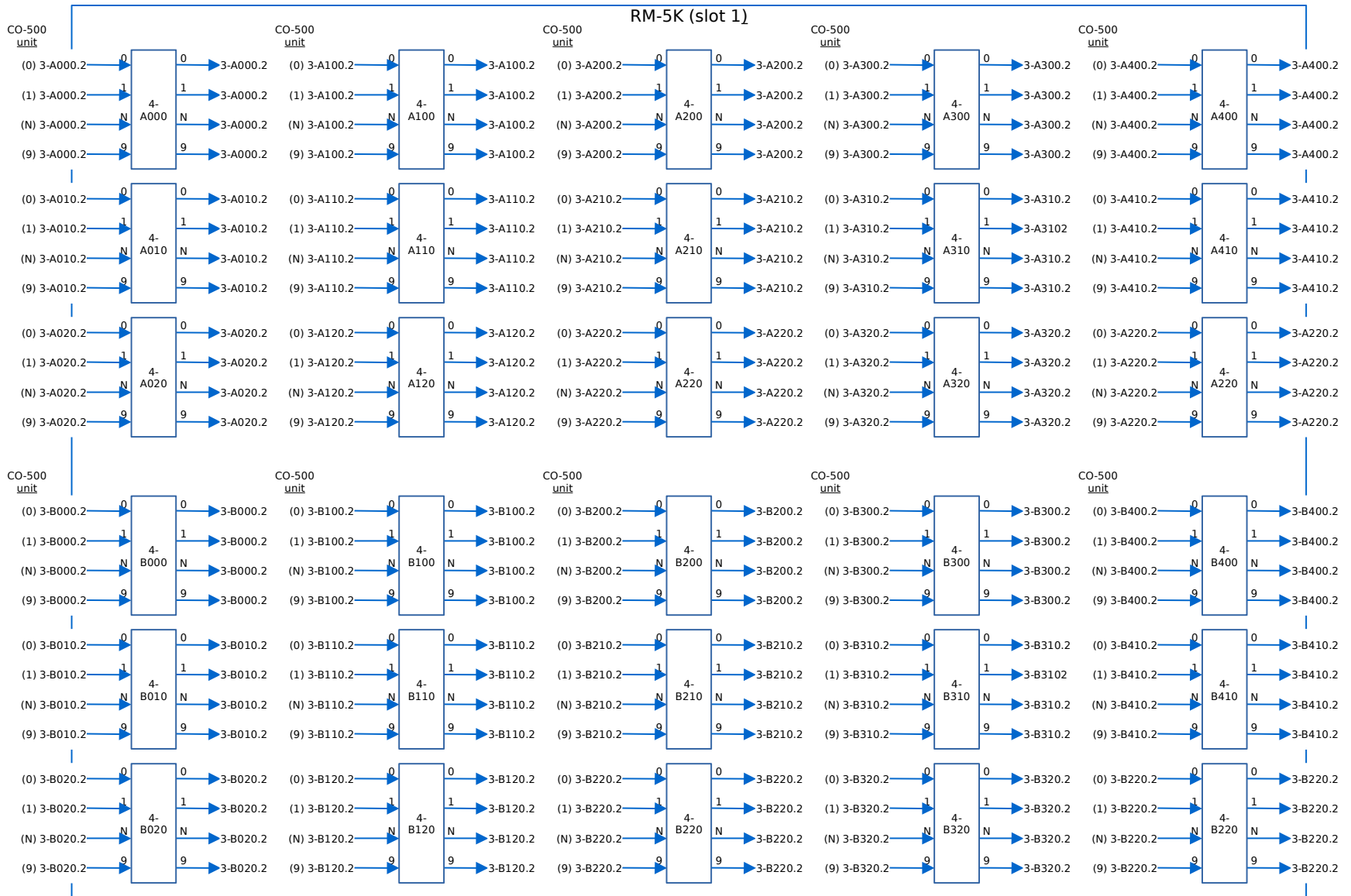
eCO-IPC:

Inter-connections between stages 3, 4 & 5 in MRE slot 1

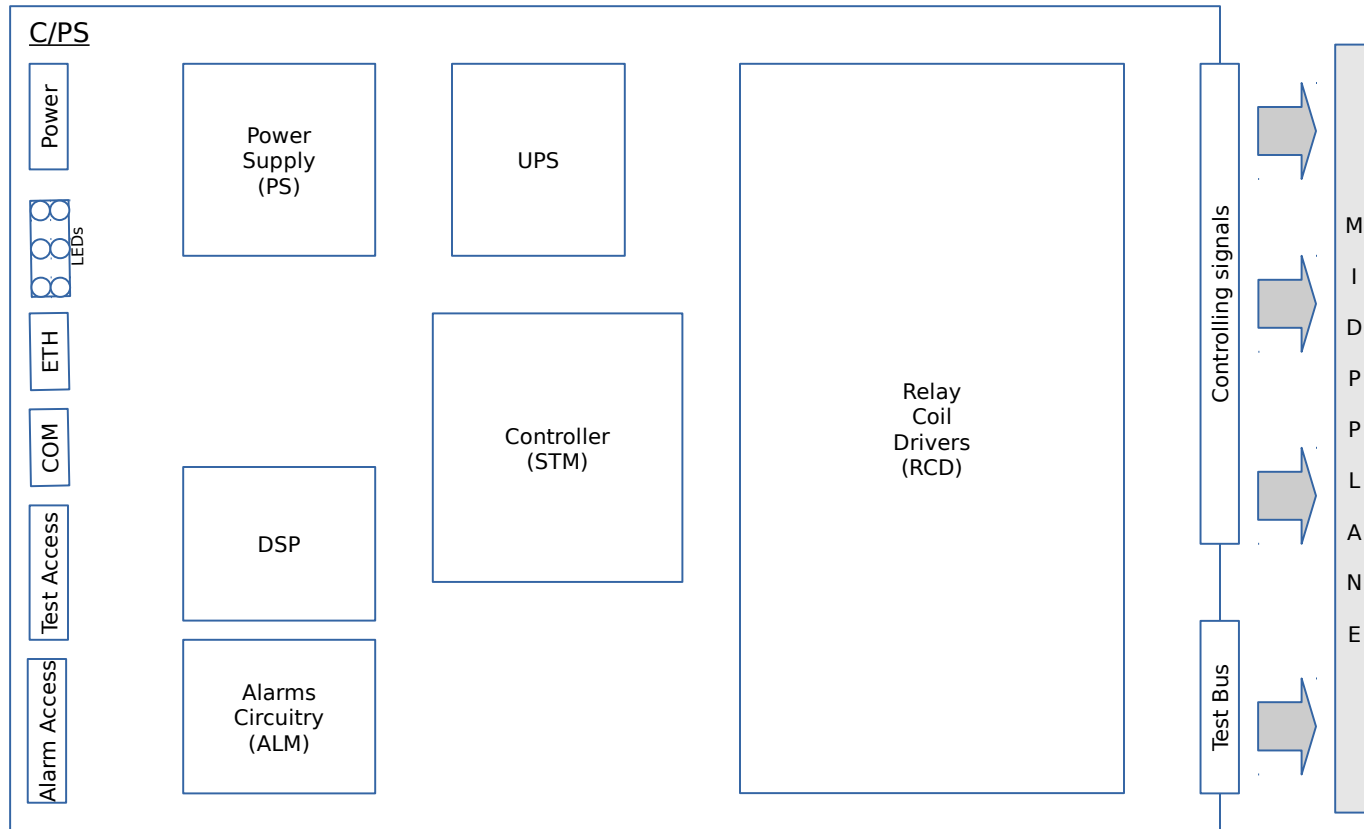


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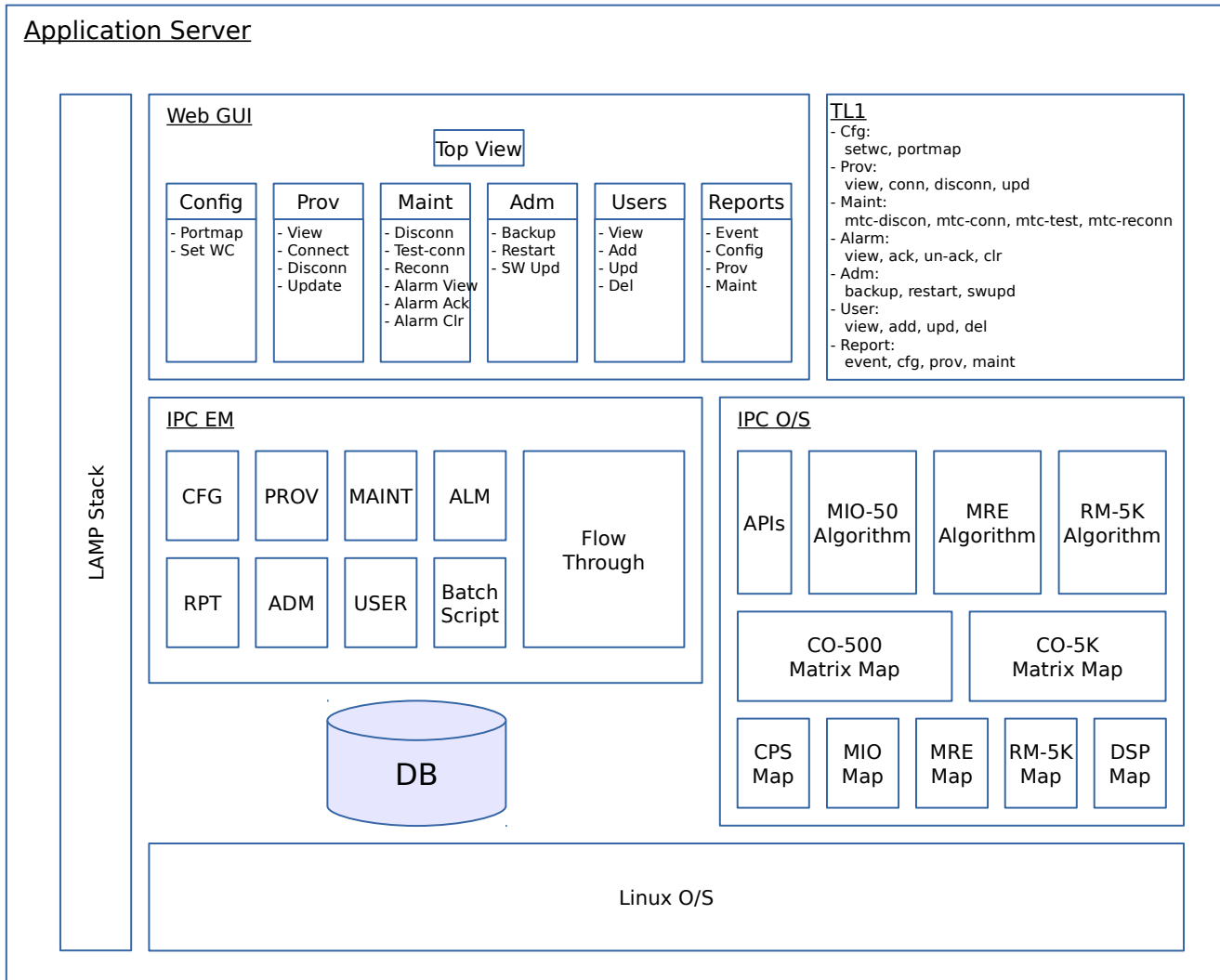
Inter-connections between stages 3 & 4 in RM-5K slot 1



eCO-IPC: Control & Power Supply Card



eCO-IPC: Application Server



eCO-IPC: CO-500 Unit

