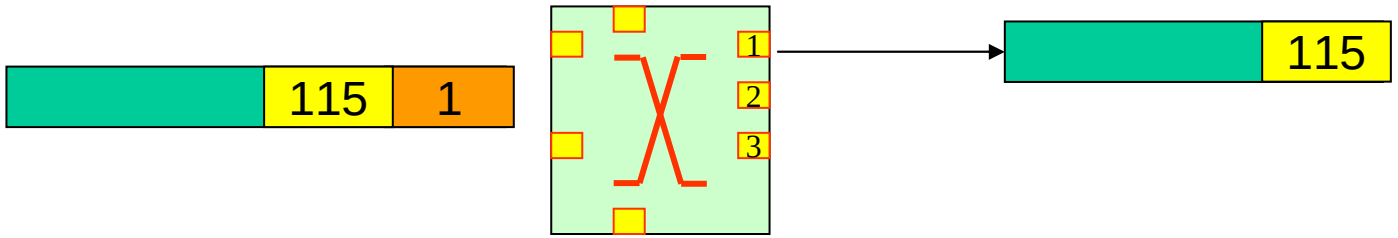
Different uses of logical addresses

Example : Implementation of bandwidth allocation schemes

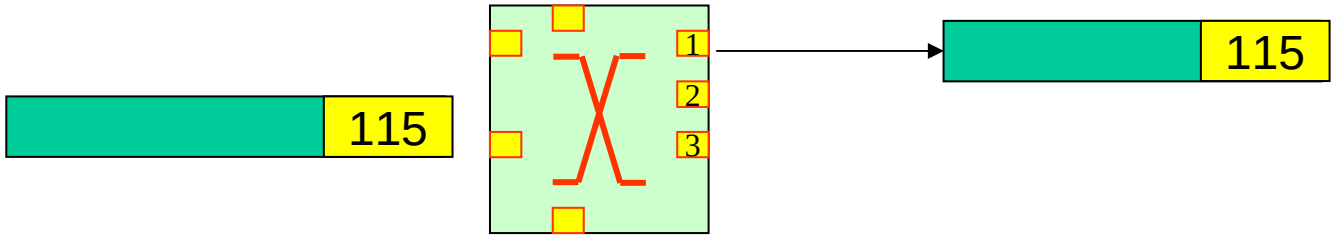
Albert Ferrer Florit
European Space Agency
TEC-EDP

Background

- Path Addressing (0-31): first byte selects the output port



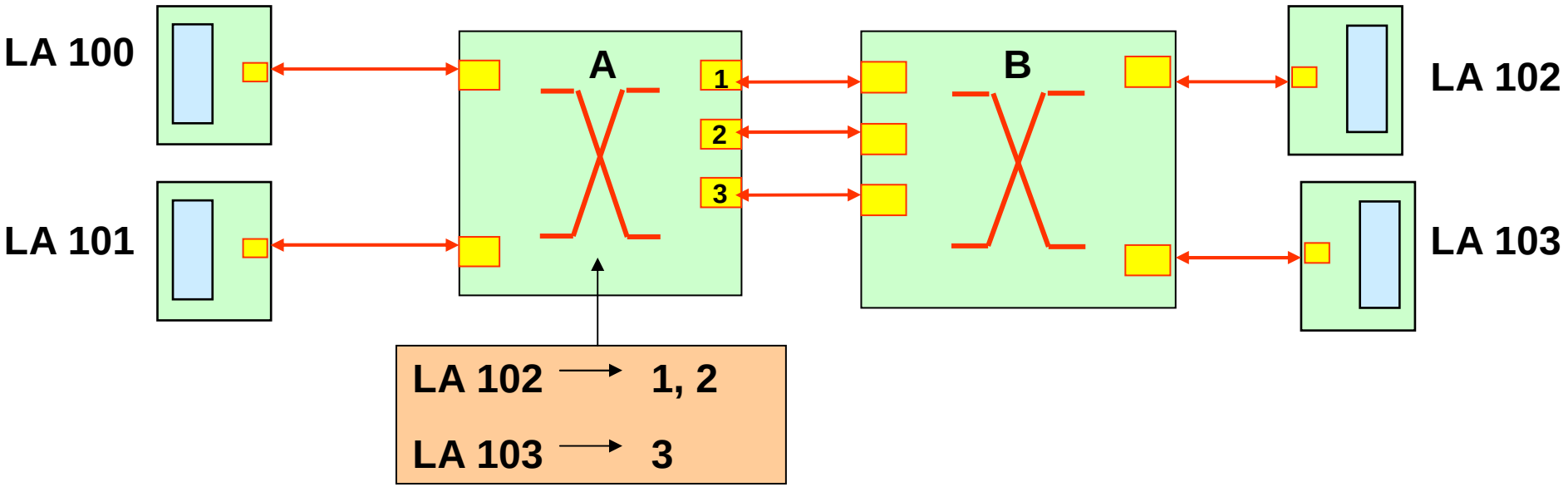
- Logical Addressing (32-255): Use of a routing table



Routing table

LA 115 -> port 1

Group Adaptive Routing example



In this scheme, bandwidth allocation only depends on the destination, not on the source or the packet type.

Introduction

- Logical Address is defined in the SpW standard as an identifier specifying the *destination* of a packet.

Question 1: What is a *destination*?

- Logical Addressing enables SpW to implement Group Adaptive Routing. Each SpW routers has a routing table that specifies for each logical address, the valid port numbers to route the packet.

Question 2: Can Group Adaptive Routing provide different bandwidths allocation schemes?

What actually means *destination*?

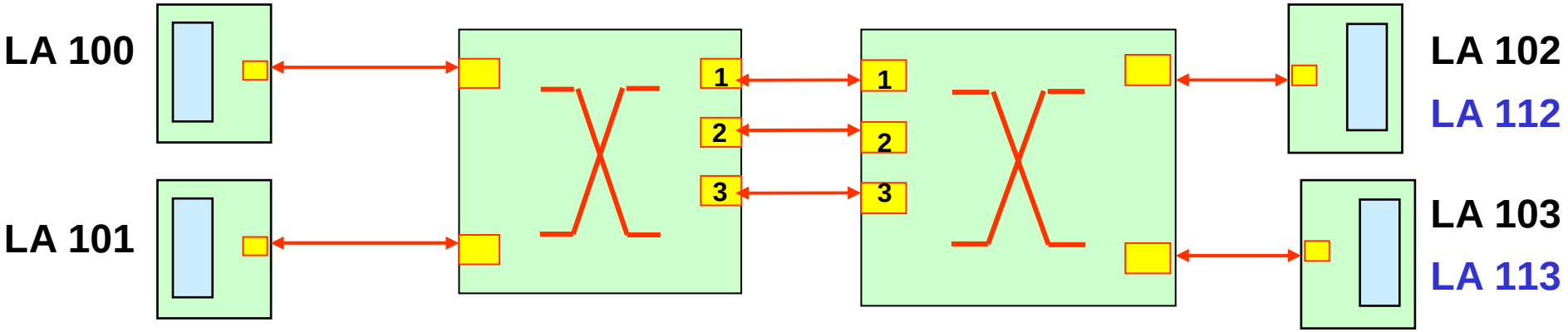
- The destination of a packet could be the name of the Node in the network or a specific application of this Node.

Example: In TCP/IP protocol the IP number identifies the node and TCP port specifies the application or purpose.

What happens if we consider the Logical Address as a specific identifier for an application?

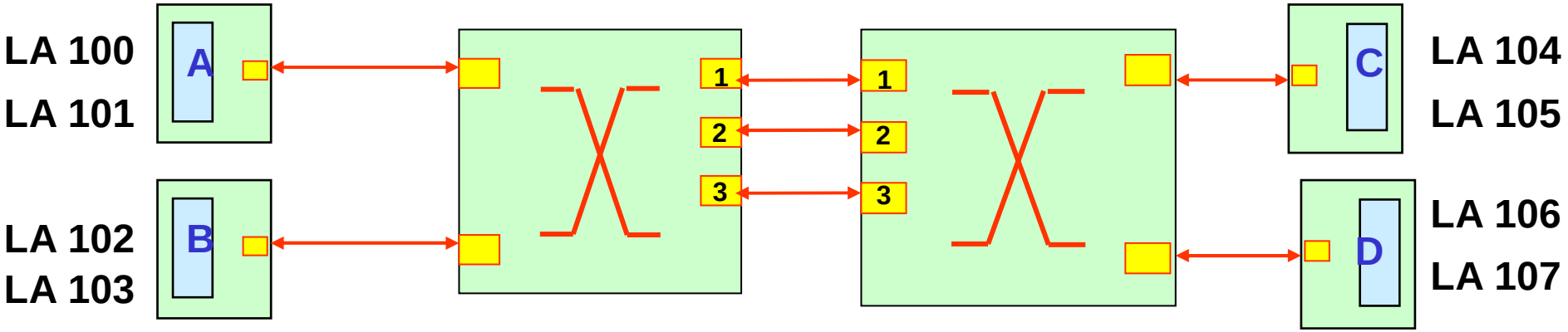
A node could accept multiple valid Logical Address, each one targeting different applications (or subsystems).

Logical Address as application identifier



LA 102, LA 103 → 1	**Application 1**	Application 2 has more bandwidth than application 1
LA 112, LA 113 → 2,3	**Application 2**	
LA 102, LA 103 → 1, 2	**Application 1**	Link bandwidth is shared but Application 2 has port 3 reserved.
LA 112, LA 113 → 1, 2, 3	**Application 2**	

Logical Address as virtual channel identifier



LA 100: C → A

LA 101: D → A

LA 102: C → B

LA 103: D → B

Each LA is a virtual channel associated to a specific source-destination pair

LA 104: A → C

LA 105: B → C

LA 106: A → D

LA 107: B → D

Meaning of a logical address

A logical address could specify:

1. The destination of a Node
2. An application or subsystem in a Node
3. A virtual channel associated to a specific source-destination pair
4. A virtual channel associated to a particular application on a specific source-destination pair
5. A channel defined by a set of valid output ports in a specific router.

In all cases Group Adaptive Routing uses the logical address to determine which ports can be used to route the packet.

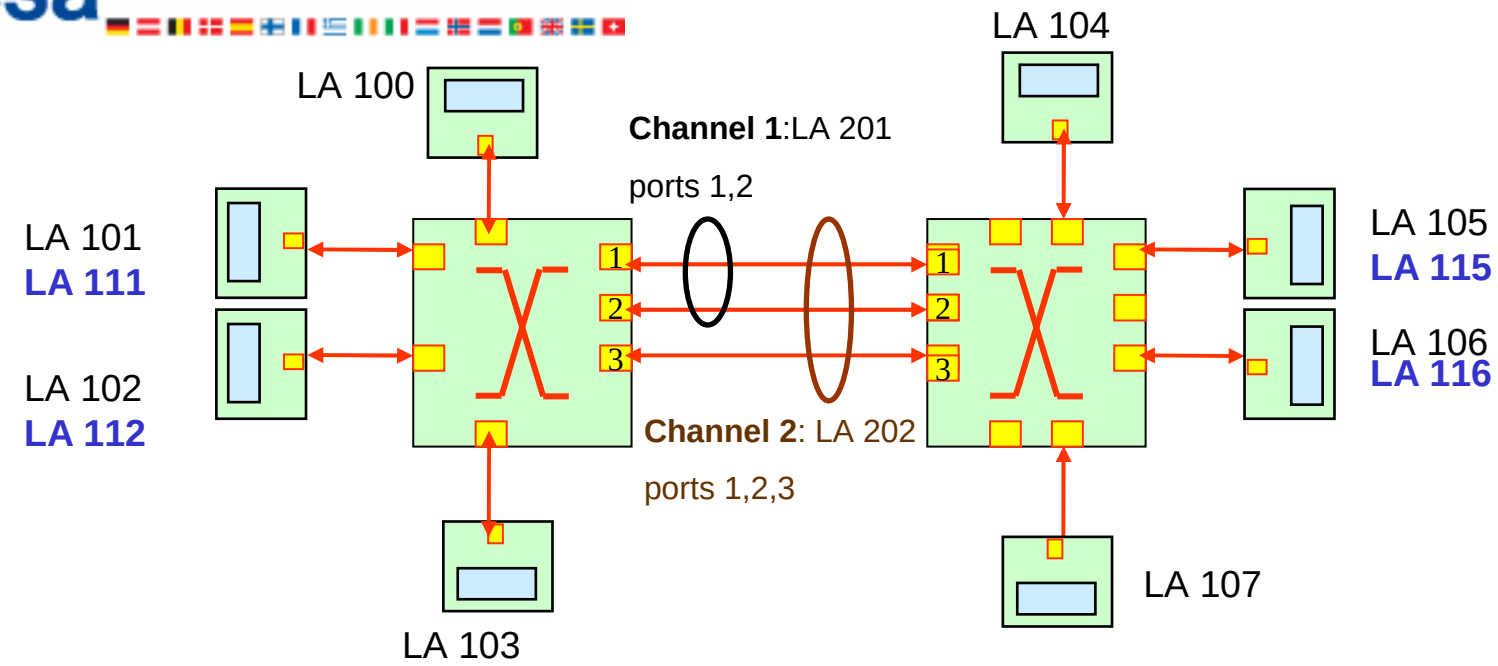
(a specific routing table specifies Reserved or shared link bandwidth available for each Logical address)

Regional Addressing

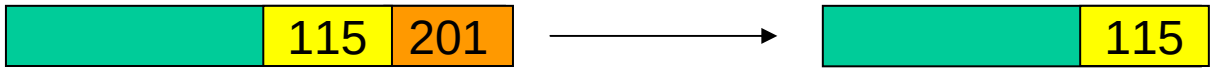
- Regional addressing is implemented by deleting the first byte of the header or first logical address. The second byte is the actual logical address in the new region.

- This concept could be used to select not the region but a channel with an associated bandwidth or possible valid paths in a router. (kind of advanced path addressing)

The Router directly connected to the destination Node would delete the 1-byte header so the destination would receive the actual logical identifier.

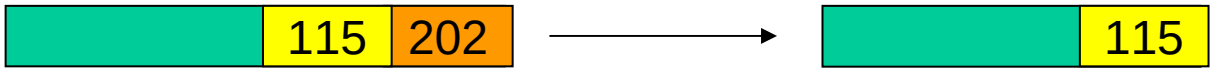


Packet sent to destination LA 115 through channel 1:

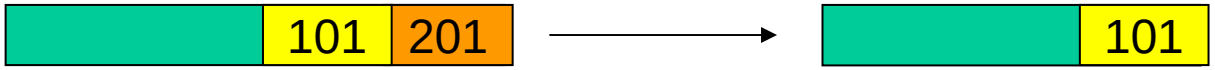


Packet sent to destination LA 115 through channel 2:

- It will have less statistical latency (“more priority”) than using channel 1
- It will be routed using port 3 only if port 1 and 2 are busy



Packet sent to destination LA 101 through channel 1:



Conclusions

- Nodes can accept multiple Logical Addresses!

- Logical addressing can be used to specify different bandwidths and “priority” schemes with minimum effort.

- The meaning of the Logical Address depends on the actual network configuration and it is application dependent.

- It is recommended that a node does not prevent (by HW) accepting more than one valid logical address

Thanks for your attention