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## Efficient dynamic configuration of a multi-ASIP turbo decoder

Vianney Lapotre, Purushotham Murugappa Velayuthan, Guy Gogniat, Amer Baghdadi, Jean-Noël Bazin, Jean-Philippe Diguët, Michael Hubner

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# Efficient dynamic configuration of a multi-ASIP turbo decoder

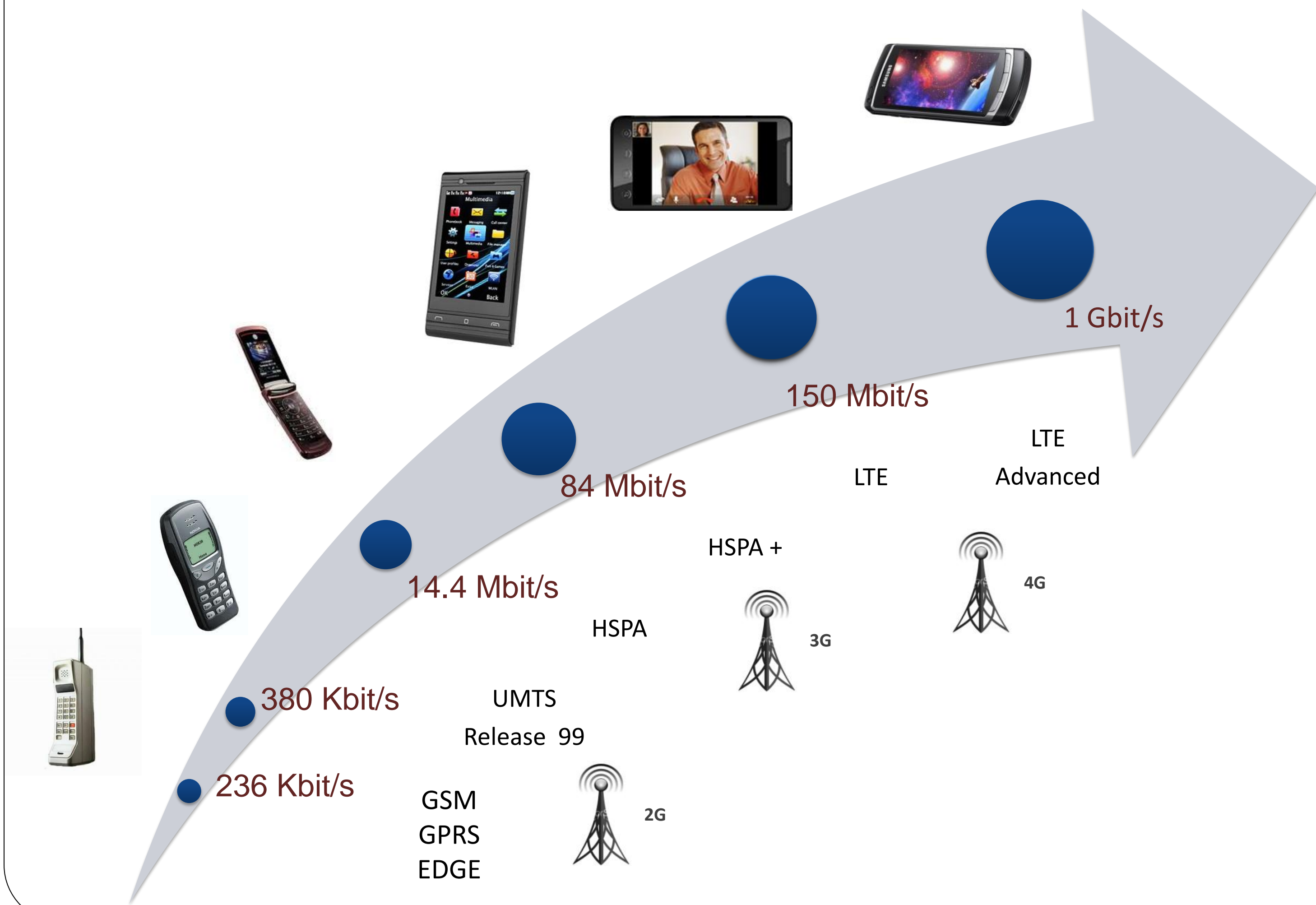
Vianney Lapotre\*, Purushotham Murugappa ¥, Guy Gogniat\*, Amer Baghdadi¥, Jean-Noël Bazin¥  
Jean philippe Diguet\*, Michael Hübner§



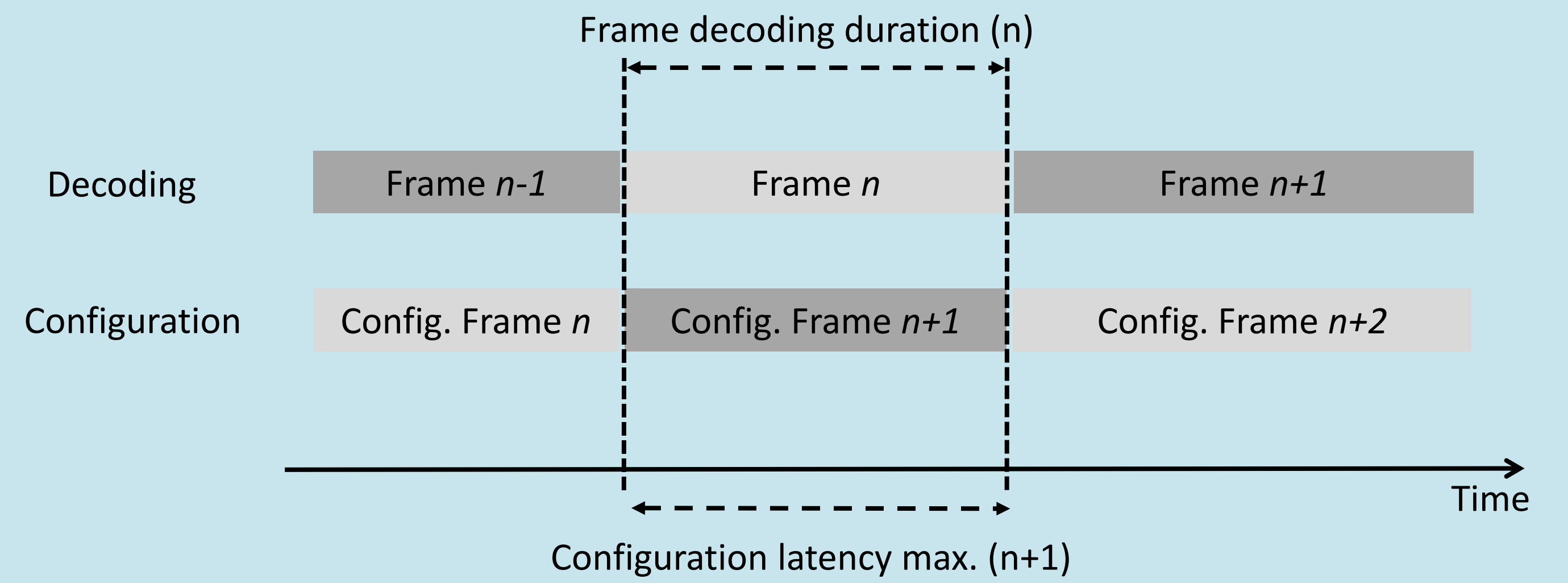
\*Univ. Bretagne Sud, UMR6285, Lab-STICC, firstname.lastname@univ-ubs.fr  
¥Telecom Bretagne, UMR6285, Lab-STICC, firstname.lastname@telecom-bretagne.eu  
§Ruh-Universität Bochum, ESIT, michael.huebner@rub.de



## Throughput evolution in telecommunication standards



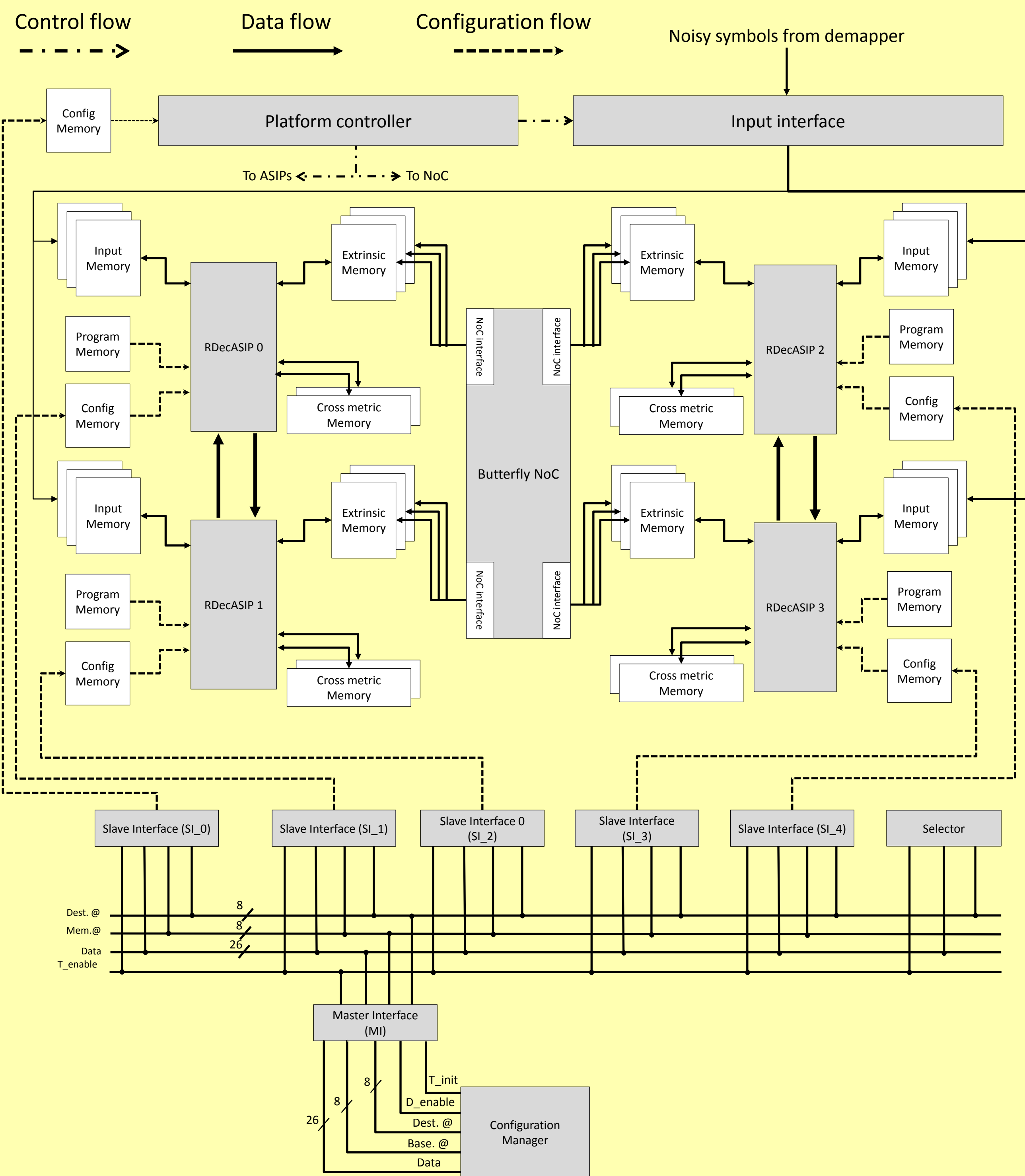
## Configuration scenario



- Each frame can require a specific configuration.
- A new configuration is generated and loaded during the decoding of the current frame.

**Due to high throughput, the frame decoding duration decreases. Thus, the maximal configuration latency critically decreases too. Reconfiguration in few  $\mu$ s becomes mandatory**

## Reconfigurable UDec architecture



## RDecASIP

- SBTC and DBTC
- Max-Log MAP algorithm
- 12 Windows of 64 symbols

**Optimized for high speed configuration**

- Generic Program for turbo decoding
- Multi configuration storage
- 1 cycle re-initialization (for the same configuration parameters)
- Smart memory organization
  - Unicast, multicast and broadcast for low latency configuration transfer

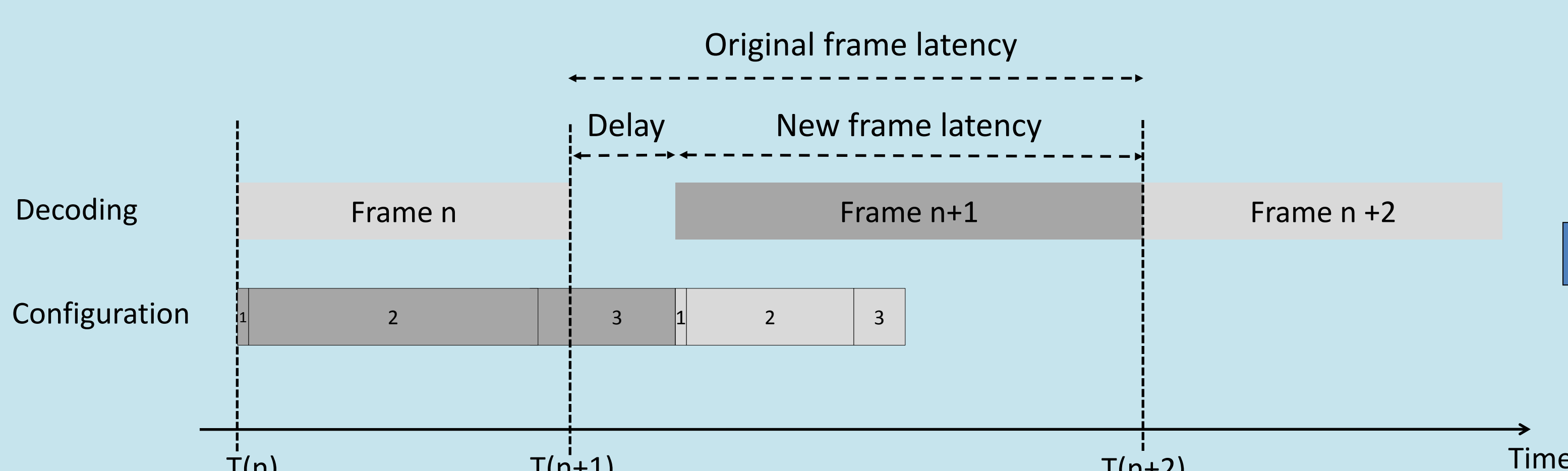
## Configuration infrastructure

- Bus-based pipelined interconnect structure
- Unicast, multicast and broadcast mechanisms
- Incremental burst transfer

### Configuration transfer latency (FPGA prototype, 125 MHz)

Nb. ASIPs	Transfer latency (in ns)			Speedup	
	This work	CoreConnect PLB 4	AMBA AXI 4	vs. CoreConnect PLB 4	vs. AMBA AXI 4
4	1 032	3 872	2 212	3.75	2.14
6	1 176	5 808	3 168	4.94	2.69
8	1 320	7 744	4 224	5.87	3.2
16	1 896	15 488	8 448	8.17	4.45
32	3 048	30 976	16 896	10.16	5.54
64	5 352	61 952	33 792	11.57	6.31

## Configuration management for very low frame decoding duration



1 Configuration manager reads new frame parameters ; 2 configuration generation ; 3 Configuration transfer

**Configuration research**

