24th AGATA Week, September 2024 - Milano

V2 Electronic data pipeline

O.Stézowski
and the Data Processing Group

Many thanks to the Data Processing Team

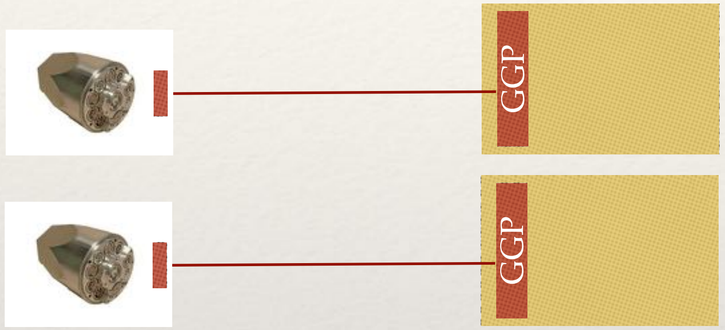
G.Baulieu, Ch. Bonnin, N.Dosme, J.Dudouet, S. Elloumi, Ph. Gauron, A. Goasduff, M.Gulmini,
A. Korichi, J. Jacob, V. Lafage, E. Legay, P. Lejeannic,
J. Ljungvall, G.Philippon, R.Molina, M. Roetto, M. Tauriga-Quere, N.Toniolo

Outlines

- Objectives
- What has been achieved
- What has to be done

V2 Electronic integration, the new data pipeline

Current situation : GGP (PCI) cards in computers

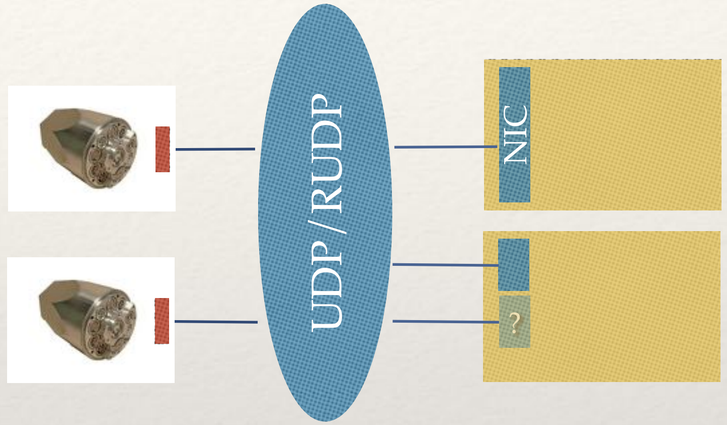


GGP are ‘home made’ products

Moving from left to right

+ cohabitation period !!!
i.e. ‘v2 acting like v1’

Future situation : NIC Network Interface Card



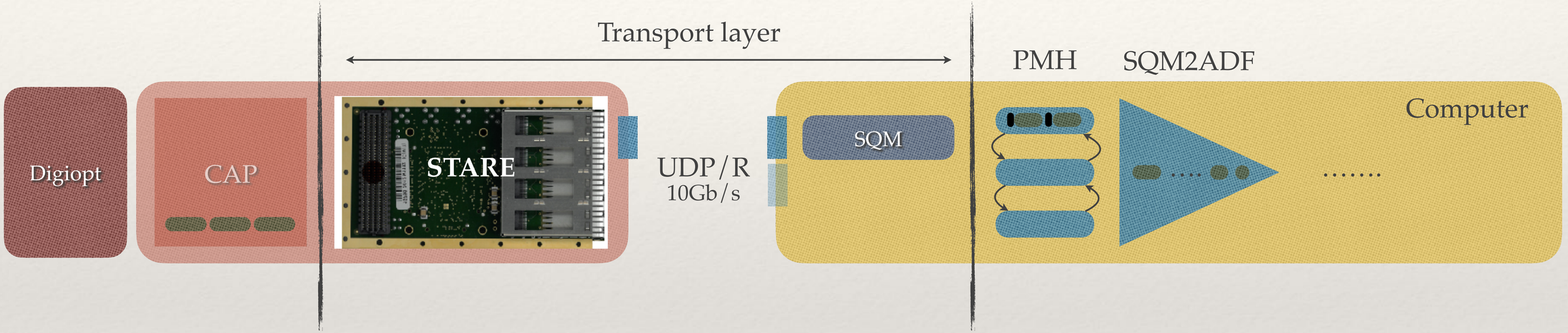
NIC are standard products

It does not mean one is better that the other one !

Ex : ’Mastering’ the Network Card + OS is required for V2

V2 Electronic integration, the new data pipeline

The main ingredients



CAP
Flux of adf frames

STARE
add header
Transfert by UDP

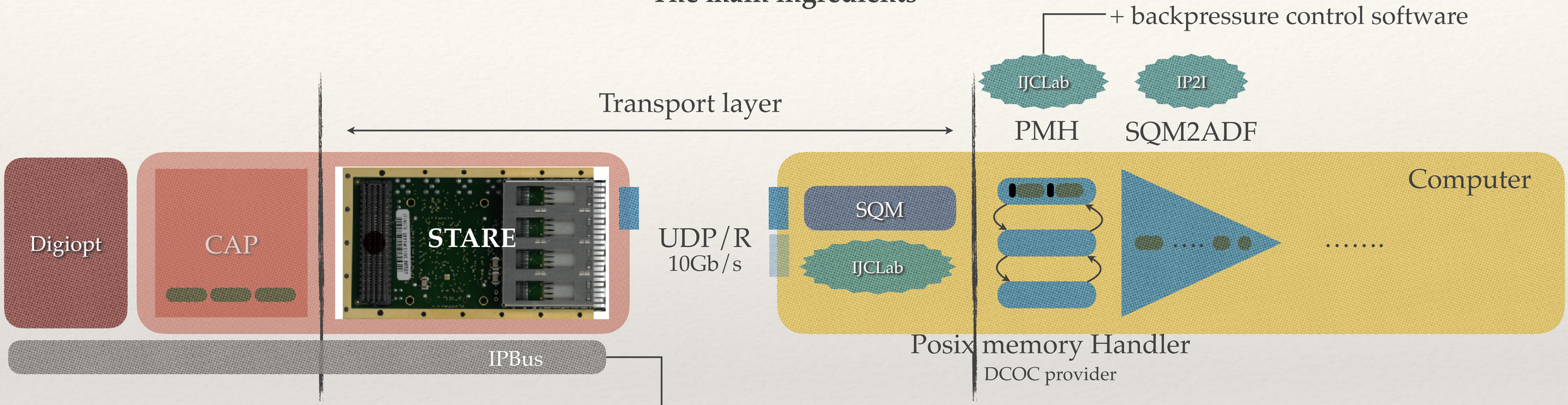
SQM process
Stare Queue Manager
Ensure adf flux is consistent
Push in RAM
PMH Posix Memory Handler

SQM2ADF
First DCOC node
Check adf consistency
+ compress adf (!!)
+ …

Posix memory Handler
DCOC provider

V2 Electronic integration, the new data pipeline

The main ingredients



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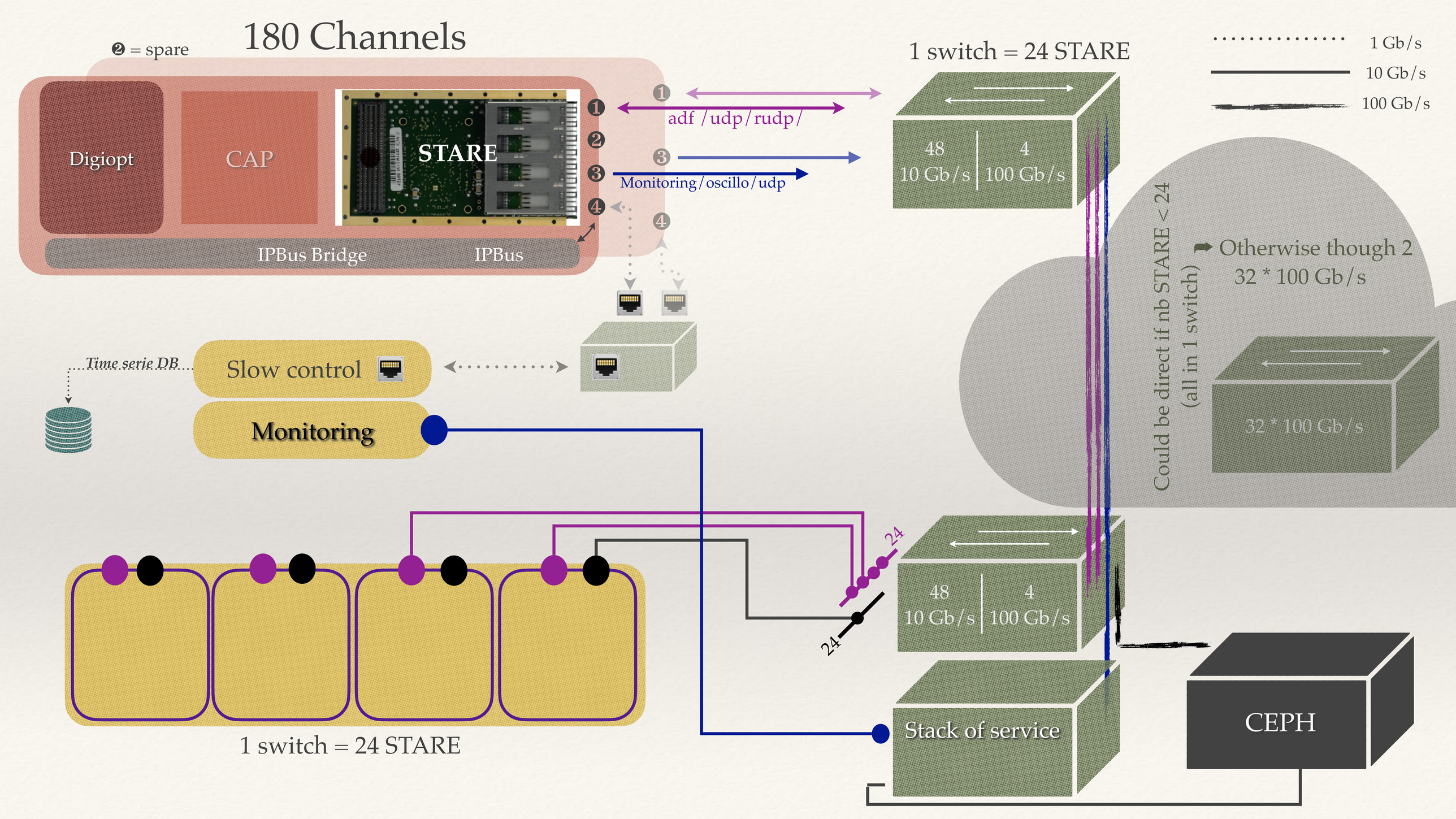
SQM2ADF
First DCOC node
Check adf consistency
+ compress adf (!!)
+ …

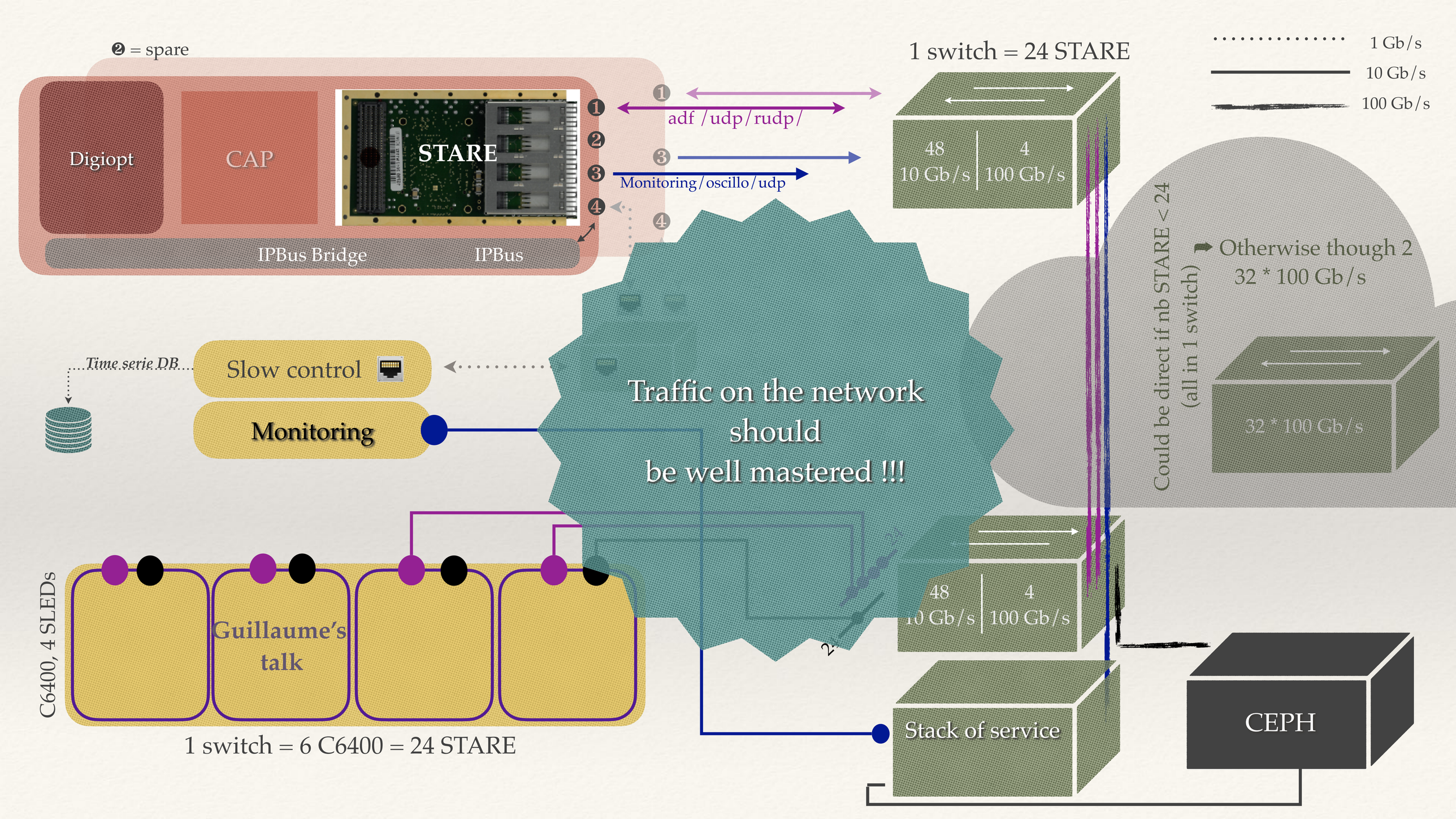
adf > MTU ⇨ STARE has to slice an event in sub-udp packet

Standard adf = 8088 bytes !

IPHC

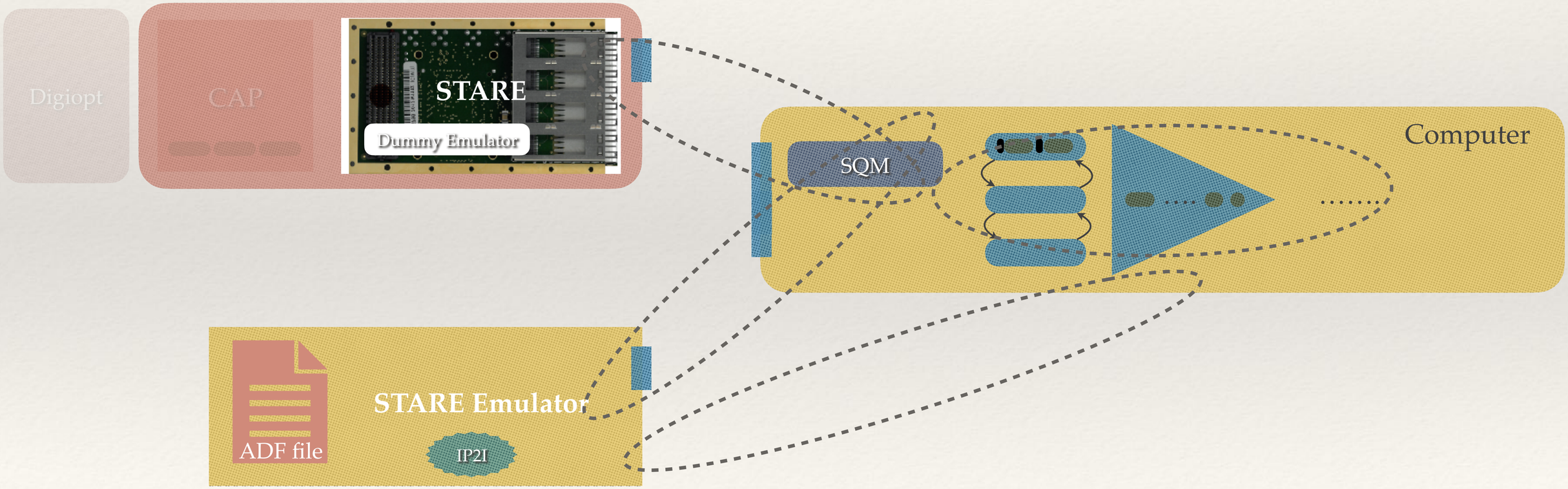
Standard MTU size for Ethernet networks is 1500 bytes
With specific configuration higher MTU 9216 = Jumbo frame


180 Channels
❷ = spare
Digiopt
CAP
STARE
IPBus Bridge
IPBus
❶
❷
❸
❹
adf /udp/rudp/
Monitoring/oscillo/udp
1 switch = 24 STARE
48
10 Gb/s
4
100 Gb/s
1 Gb/s
10 Gb/s
100 Gb/s
Could be direct if nb STARE < 24
(all in 1 switch)
➡ Otherwise though 2
32 * 100 Gb/s
32 * 100 Gb/s
Time serie DB
Slow control
Monitoring
24
24
48
10 Gb/s
4
100 Gb/s
Stack of service
CEPH
1 switch = 24 STARE


❷ = spare
Digiopt
CAP
STARE
IPBus Bridge
IPBus
1 switch = 24 STARE
1 Gb/s
10 Gb/s
100 Gb/s
❶
adf /udp/rudp/
❷
❸
Monitoring/oscillo/udp
❹
❹
48
10 Gb/s
4
100 Gb/s
Could be direct if nb STARE < 24
(all in 1 switch)
➡ Otherwise though 2
32 * 100 Gb/s
32 * 100 Gb/s
Time serie DB
Slow control
Monitoring
Traffic on the network
should
be well mastered !!!
48
10 Gb/s
4
100 Gb/s
C6400, 4 SLEDs
Guillaume's
talk
1 switch = 6 C6400 = 24 STARE
Stack of service
CEPH

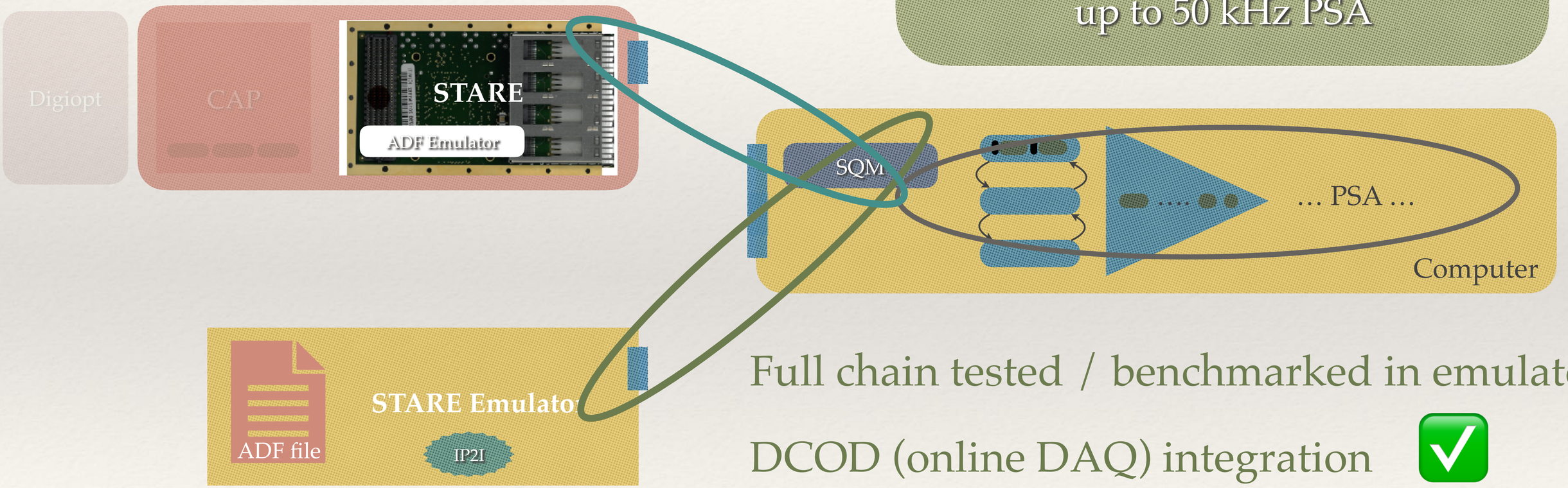
Situation @ previous AGATA Week

First version of the different bricks developed using emulators in specific environnements



Situation @ this AGATA Week

Tests realised with the objective of up to 50 kHz PSA



Full chain tested / benchmarked in emulators

DCOD (online DAQ) integration ✅

➥Effort to port dcod on last Debian/compiler versions

Situation @ this AGATA Week

We have now data from real detector out of DIGIOPT-CAP-STARE up to SQM then dumped in files

Remember

if one ‘event’ ▬ produced by CAP is < 1 MTU

➥ it is transferred by STARE as one unit = one UDP packet

if one ‘event’ ▬ produced by CAP is > 1 MTU

➥ it is transferred by STARE split on several UDP packets

PACE can deliver much more that one type of adf !

Module Origin	Crystal Status Name	Mode	Type	Code	AdF Type	AdF Version	Description	Status
GTS Trigger Match	DATA_100_SC	DA	Data	00 Call	DA00	Simple	0	Normal Data 100 samples triggered by slow control call	Impl
	DATA_100_RP	DA	Data	01 Timer	DA01	Simple	0	Normal Data 100 samples triggered by timer (Fixed datarate)	Impl
	DATA_100_TL	DA	LTC	10 Loc	DA10	Simple	0	Normal Data 100 samples triggered by localtrigger data from long traces buffer	Impl
	DATA_100_TG	DA	Data	02 Loc	DA02	Simple	0	Normal Data 100 samples triggered by localtrigger (datapath)	Impl
	DATA_100_GT	DA	Data	03 GTS	DA03	Simple	0	Normal Data 100 samples triggered by gts validation	Impl
	DATA_200_SC	DA	Data	A0 Call	DAA0	Extended	0	Normal Data 200 samples triggered by slow control call	Impl
	DATA_200_RP	DA	Data	A1 Timer	DAA1	Extended	0	Normal Data 200 samples triggered by timer (Fixed datarate)	Impl
	DATA_200_TG	DA	Data	A2 Loc	DAA2	Extended	0	Normal Data 200 samples triggered by localtrigger (datapath)	Impl
	DATA_200_GT	DA	Data	AA GTS	DAAA	Extended	0	Normal Data 200 samples triggered by gts validation	Impl
LTb Long Traces Buffer	LT_4k_SC	CE	LTC	00 Call	CE00	Simple	0	Long Traces data 4k samples triggered by slow control call	Impl
	LT_4k_RP	CE	LTC	01 Timer	CE01	Simple	0	Long Traces data 4k samples triggered by timer (Fixed datarate)	Impl
	LT_4k_TG	CE	LTC	02 Loc	CE02	Simple	0	Long Traces data 4k samples triggered by localtrigger (datapath)	Impl
	LT_4k_GT	CE	LTC	03 GTS	CE03	Simple	0	Long Traces data 4k samples triggered by gts validation	Impl
	LT_4x1k_SC	CE	LTC	10 Call	CE10	Extended	0	4 channel Long Traces data 4k samples triggered by slow control call	Impl
	LT_4x1k_RP	CE	LTC	11 Timer	CE11	Extended	0	4 channel Long Traces data 4k samples triggered by timer (Fixed datarate)	Impl
	LT_4x1k_TG	CE	LTC	12 Loc	CE12	Extended	0	4 channel Long Traces data 4k samples triggered by localtrigger (datapath)	Impl
	LT_4x1k_GT	CE	LTC	13 GTS	CE13	Extended	0	4 channel Long Traces data 4k samples triggered by gts validation	Impl
	LT_8k_SC	CE	LTC	A0 Call	CEA0	Extended	0	Long Traces data 8k samples triggered by slow control call	Impl
	LT_8k_RP	CE	LTC	A1 Timer	CEA1	Extended	0	Long Traces data 8k samples triggered by timer (Fixed datarate)	Impl
	LT_8k_TG	CE	LTC	A2 Loc	CEA2	Extended	0	Long Traces data 8k samples triggered by localtrigger (datapath)	Impl
	LT_8k_GT	CE	LTC	A3 GTS	CEA3	Extended	0	Long Traces data 8k samples triggered by gts validation	Impl
vLTb Very Long Traces Buffer	LT_100k_SC	CE	LTC	B0 Call	CEB0	Extended	0	Very Long Traces data 8k samples triggered by slow control call	TBD
	LT_100k_RP	CE	LTC	B1 Timer	CEB1	Extended	0	Very Long Traces data 8k samples triggered by timer (Fixed datarate)	TBD
	LT_100k_TG	CE	LTC	B2 Loc	CEB2	Extended	0	Very Long Traces data 8k samples triggered by localtrigger (datapath)	TBD
	LT_100k_GT	CE	LTC	B3 GTS	CEB3	Extended	0	Very Long Traces data 8k samples triggered by gts validation	TBD
Spectra Buffer	SPC_100_SC	FA	SPC	01 Call	FA01	Simple	0	Short 100 bin spectra for all channel trigger by slow control call	Impl
	SPC_100_RP	FA	SPC	02 Call	FA02	Simple	0	Short 100 bin spectra for all channel trigger by timer	Impl
	SPC_4kp_SC	FA	SPC	10 Call	FA10	Simple	0	Long 4k bin spectra for one channel trigger by slow control call	Impl
	SPC_8kp_SC	FA	SPC	A0 Call	FAA0	Extended	0	Long 8k bin spectra for one channel trigger by slow control call	TBD
System	IDLE				BEDD	Simple	0	IDLE empty message sent each IDLE TIME (set by slow control)	Impl
	ERROR				EEEE	Simple	0	On call (trigger/slow control) system was on error	Impl
	SYSOFF				DEAD	Simple	0	On call (trigger/slow control) system is off (Digitizer/Readout)	Impl

Some are **simple** i.e. coded using < Max MTU

- ➥ requires only one UDP paquet !
- ➥ Just need to be sure we have received it

Other are **extended** i.e. coded using > Max MTU

- ➥ requires more than one UDP paquet !
- ➥ we need to have all received !
- ➥ we need to reconstruct !

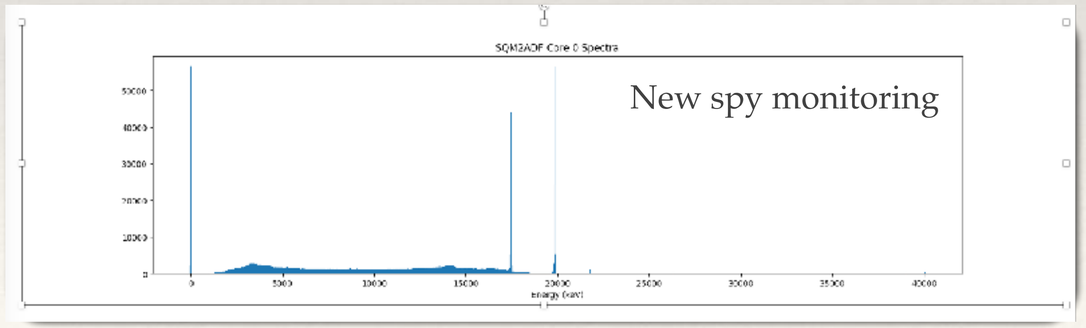
} Spectra produced inside the card & sent embedded in the data stream

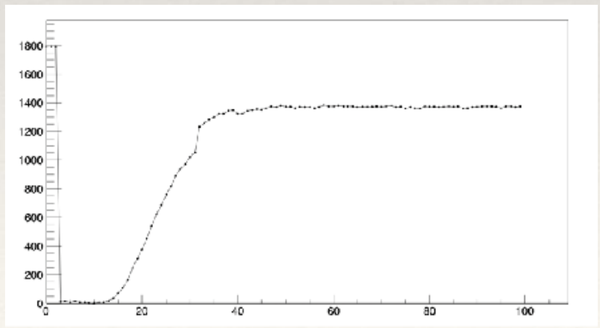
} Information (idles, errors) embedded in an adf frame

Situation @ this AGATA Week

SQM2ADF improved+benchmarked to handle all the situations

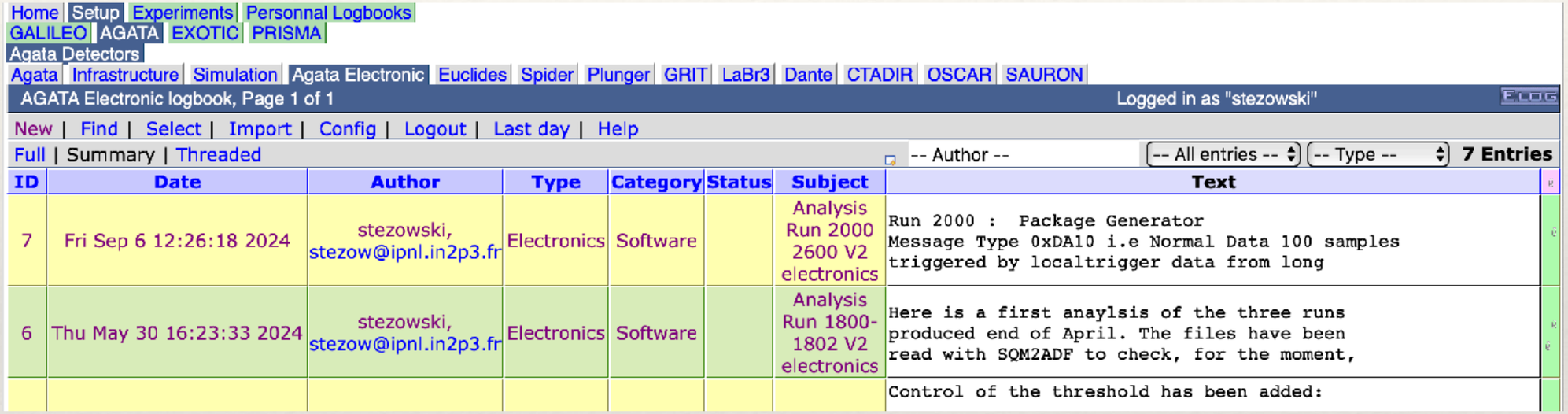
Ex : these pictures are from a real detector through the pipeline @ SQM2ADF level





Work for the coming weeks/months

Data stream NOT YET fully (70-80% ok) under control ☛ interactions with FEE group



Home | Setup | Experiments | Personnal Logbooks
GALILEO | AGATA | EXOTIC | PRISMA
Agata Detectors
Agata | Infrastructure | Simulation | Agata Electronic | Euclides | Spider | Plunger | GRIT | LaBr3 | Dante | CTADIR | OSCAR | SAURON

AGATA Electronic logbook, Page 1 of 1 — Logged in as "stezowski" — ELOG

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Full | Summary | Threaded — -- Author -- — -- All entries -- — -- Type -- — 7 Entries

ID	Date	Author	Type	Category	Status	Subject	Text
7	Fri Sep 6 12:26:18 2024	stezowski, stezow@ipnl.in2p3.fr	Electronics	Software		Analysis Run 2000 2600 V2 electronics	Run 2000 : Package Generator Message Type 0xDA10 i.e Normal Data 100 samples triggered by localtrigger data from long
6	Thu May 30 16:23:33 2024	stezowski, stezow@ipnl.in2p3.fr	Electronics	Software		Analysis Run 1800-1802 V2 electronics	Here is a first anaylsis of the three runs produced end of April. The files have been read with SQM2ADF to check, for the moment,
							Control of the threshold has been added:

Once ok, we can move to data quality, calibrations and PSA

+ handling of many detectors in parallel … anticipation (see other talks)