DBBC3 commissioning

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Intro

- Sent out a concept/questionnaire document
- Thanks Giuseppe et al. and Jun et al.
- Summary
- Plans/discussion

VEX2

- No (as expected)
- VEX1 for stations
- VEX2 for JIVE

Data streams, threads and channels

- Limited flexibility in DBBC3 configuration
- Simple VDIF explanation
- Mapping for each configuration
- Keep things simple

eVLBI routing

- DBBC2/FILA10G has separate output for station/JIVE
- No direct connection from the DBBC3 outputs
- Use FlexBuffs as routers:
  - Using jive5ab
  - Using NAT forwarding
    - Formatter test at 4x2Gbps
    - Documentation will be on Deki

DBBC3 packets forwarding for eVLBI observations

Giuseppe Maccaferri - IRA-INAF(*Italy*)

EVN TOG meeting, *Torun - 13-14 December 2023*

Overview

In this document it will be explained how Medicina and Noto have configured their new DBB3 and FlexBuffer(FB) backend to perform local recording and even the data forwarding to remote location, like international correlator. The basic idea is to extend the DBBC2 well tested VLBI configuration and operations actually in use, to the most performing DBBC3 VLBI backend[1]. We will refers to the DDC_Ev126[2] firmware, the last available and specifically developed for EVN observations in Digital Direct Conversion (DDC) mode.

DBBC3 and FlexBuffer configuration

The DDC_Ev126 gives first 8 bbc group from IFA, other 8 bbc (9 to 16) from IFB and following 8bbc groups for the others IF. To keep the schema most closed as possible to actual DBBC2, just to make easy the Field System(FS)[3] schedule adaption even to DBBC3, we connected IFA to rcp and IFB to lcp of the "in-line" receiver, so first 8 bbc (1-8) bring rcp and second group (9-16) the lcp. The others IF are supposed to be connected to to others receivers or pols in case of a multi band/beam receivers, like the CTR (Compact Triband Receiver) we soon will mount on Medicina and Noto radio telescope, or stay unused, in case of single band/beam receivers.

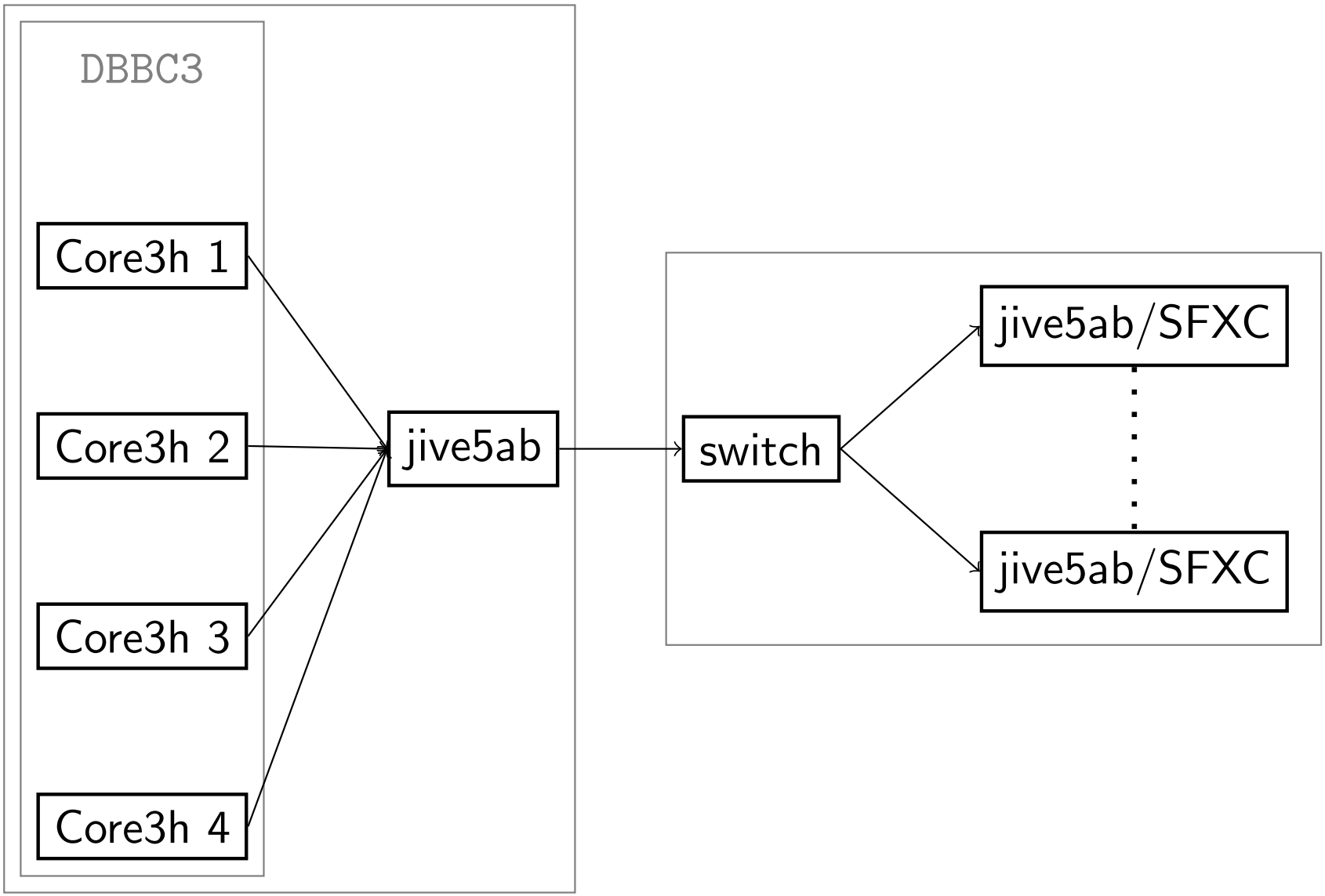
For each used IF (or core), only one eth of the four, eth0, is now used and connected to our new FlexBuffer's(FB) 10Gbps interface. In a next firmware release, might be possible that another eth can mirror the same eth0 traffic, so permitting local recording and correlator forwarding. But this option seems not very important, since so far all eVLBI observations never required the simultaneous local recording.

The core3h and FB Ethernet interfaces are configured in private LANs, all prefixed by 192.168. We assigned a different LAN to each eth, because this is a point to point connection schema with no network switch involved. We decided to compose the third IP digit with the core number plus the eth number, just to make easy its identification, while the fourth IP digit is usually '1' for the eth and '30' for the FB. This is the last number available in a /27 class C network and is assigned to FB that act as gateway for each LAN. Below an example table.

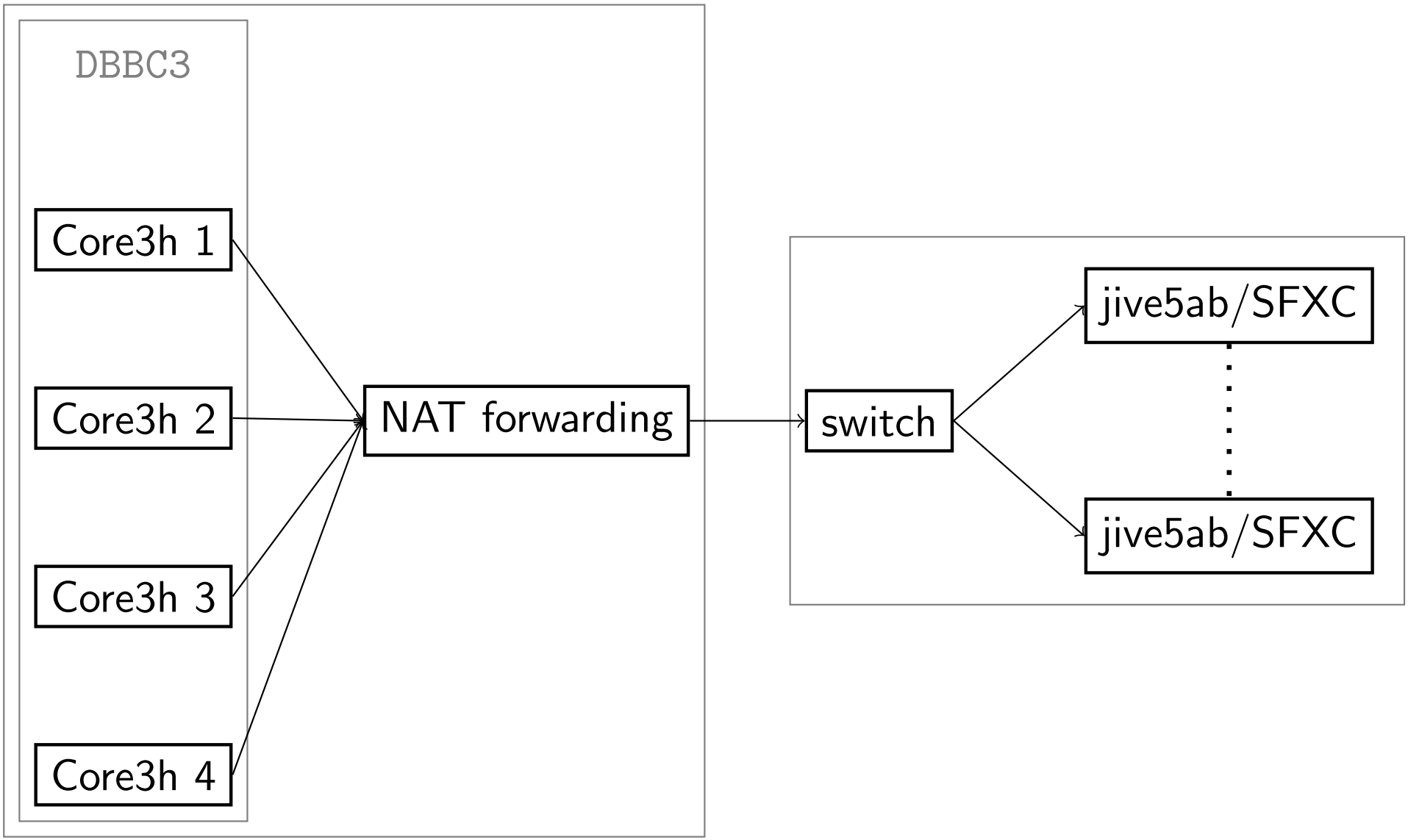
			eth				gw/net	Destination0		
Ric/pol	IF	core	0	1	2	3	30/27	who	dev	IP
KR (dbbc2 A)	A	1	192.168.10.1	192.168.11.1	192.168.12.1	192.168.13.1	192.168.10.30/27	FB	ens106f0	192.168.10.30
KL (dbbc2 C)	B	2	192.168.20.1	192.168.21.1	192.168.22.1	192.168.23.1	192.168.20.30/27	FB	ens106f1	192.168.20.30
QR (K1R)	C	3	192.168.30.1	192.168.31.1	192.168.32.1	192.168.33.1	192.168.30.30/27	FB	ens106f2	192.168.30.30
QL (K1L)	D	4	192.168.40.1	192.168.41.1	192.168.42.1	192.168.43.1	192.168.40.30/27	FB	ens106f3	192.168.40.30
WR	E	5	192.168.50.1	192.168.51.1	192.168.52.1	192.168.53.1	192.168.50.30/27	FB	ens106f4	192.168.50.30
WL	F	6	192.168.60.1	192.168.61.1	192.168.62.1	192.168.63.1	192.168.60.30/27	FB	ens106f5	192.168.60.30
	G	7	192.168.70.1	192.168.71.1	192.168.72.1	192.168.73.1	192.168.70.30/27	FB	ens106f6	192.168.70.30
	H	8	192.168.80.1	192.168.81.1	192.168.82.1	192.168.83.1	192.168.80.30/27	FB	ens106f7	192.168.80.30
net_port			46220	46221	46222	46223				

1 G.Tuccari & all - DBBC3 — the new wide-band backend for VLBI (https://pos.sissa.it/344/140/pdf)
2 Sven Dornbusch, MPIfR - Setting up the DBBC3 for DDC_E mode manual
3 Himwich, E., "Introduction to the Field System for Non-Users", IVS 2000 General Meeting Proceedings, N. R. Vandenberg and K.D. Baver, 86-90, 2001

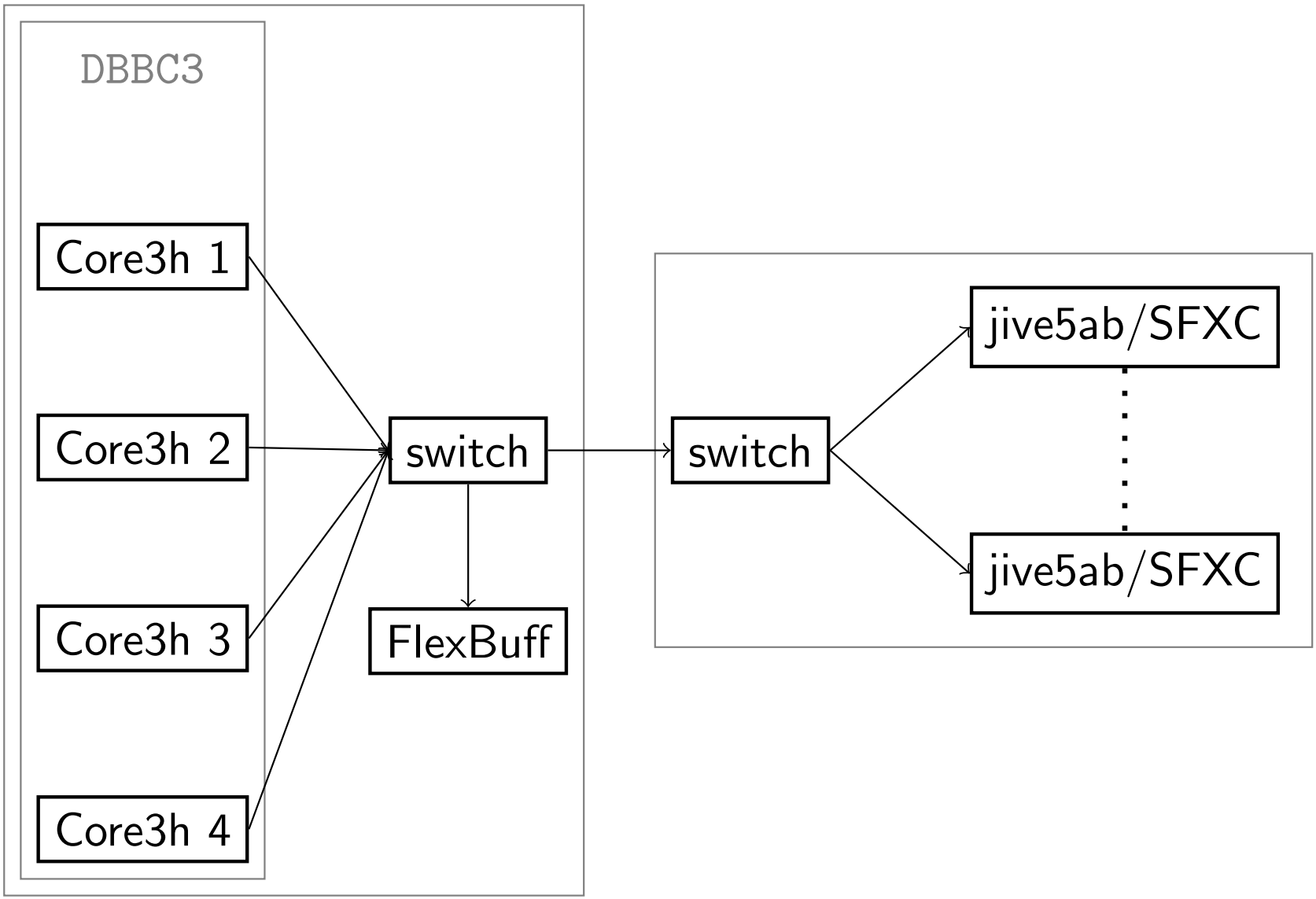
eVLBI using jive5ab



eVLBI using NAT forwarding



eVLBI using switch



eVLBI configuration

- Reconfiguration takes a lot off time, so don't do it from JIVE
- Current DBBC2/FILA10G commands given
  - `vdif_legacy off`, `vdif_enc on`
  - `vsi_bitmask`, `vsi_samplerate <decimation>`
  - `vdif_frame`
  - `reset keepsync`, `start vdif`, `stop`, `destination <n> <ip:port>/none`

Testing

- Disk
  - Got parallel data from On, Ef, Ys and Mc
  - Dedicated testing experiments
  - Science verification
- eVLBI
  - Deploy NAT forwarding over stations
  - With enough stations: correlator test