

DBBC Production and delivery status

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- **HAT-Lab is a spin-off company endorsed by INAF, set in July 2009**
- **HAT-Lab main task is to produce DBBC back-ends in close collaboration with IRA and MPI**
- **Production activity is shared between Italy (Catania and Noto) and Germany (Bonn)**
- **Development of new VLBI components and equipment in collaboration with EVN partners**

Pre-HAT-Lab system production (in red EVN stations):

DBBC1 Noto

DBBC1 Wettzell1 (later updated to DBBC2)

DBBC1 Wettzell2 (later updated to DBBC2)

DBBC1 Wettzell3 (later updated to DBBC2)

DBBC2 Effelsberg

DBBC2 Yebes

DBBC2 Auscope1 (Hobart12M)

HAT-Lab Batch 1 – production and delivery 2009-10

DBBC2 **Onsala**

DBBC2 **Sardinia Radio Telescope**

DBBC2 **Pico Veleta**

DBBC2 **APEX**

DBBC2 **Wark12M**

DBBC2 **Auscope2 (Kath12M)**

DBBC2 **Auscope3 (Yarr12M)**

HAT-Lab Batch 2 – production and delivery 2010-11

DBBC2 Torun

DBBC2 Irbene

DBBC2 Hartebeesthoek1

DBBC2 Hartebeesthoek2

DBBC2 Auscope4 (Ceduna)

HAT-Lab Batch 3 – production and delivery 2011-12
(still under definition)

DBBC2 **Medicina**

DBBC2 **Metsahovi**

DBBC2 **Auscope5 (Hobart26)**

DBBC2 **Seshan (order to be completed)**

Station	DBBC	Comment
Noto	Available	
Effelsberg	Available	FILA10G available
Onsala	Available	FILA10G ordered
Yebes	Available	
Wettzell	Available 3	
Torun	Available	
Metsähovi	Ordered	FILA10G ordered
Hartebeesthoek	Available 2	FILA10G available 2
Medicina	Ordered	FILA10G ordered
Westerbork	-	
Jodrell Bank	-	
Cambridge	-	
Svetloe	-	Own semi-digital system
Zelenchukskaya	-	Own semi-digital system
Badary	-	Own semi-digital system
Urumqi	-	Own digital system
Shanghai	To be ordered soon	Own digital system
Arecibo	-	RDBE
Robledo	-	
Sardinia	Available	FILA10G available
Simeiz	-	
Venspils	Available	
Evpatoria	-	

Existing Firmware/Functionality

**DDC – 4 IF to produce 16 bbs tunable 16-8-4-2-1 MHz
(2 x 1 Gbps) = 2 Gbps**

**PFB - 4 IF to produce 15 fixed 32 MHz / IF
(4 x 2 Gbps) = 8 Gbps**

**DSC (Direct sampling Conversion) - 512 MHz
in a single band (4 x 2 Gbps) = 8 Gbps**

**DSC (Direct sampling Conversion) - 1024 MHz
in a single band (4 x 4 Gbps) = 16 Gbps**

**Spectrometer - 4x512 MHz, 32768 spectral channels
(firmware ready, calibration software under development)**

FILA10G

- **Interface between the DBBC VSI-H output and 10G network for packet sending at 1 – 2 – 4 – 8 - 16 Gbps VLBI standard data rate**
- **Two network ports for independent connections (ex. MK5C and Jive correlator)**
- **In parallel possible recording on MK5B**
- **MK5B and VDIF (multi-channel/single thread) formatter mode**
- **26 different packet sizes possible**
- **VDIF (single-channel/multi-thread) under development**
- **complete IP/UDP stack is provided with an independent set of destination address/port per channel**

■ Control software via sockets

- DBBC='{DBBC command}' to control DBBC from FS
- FS implementation underway (Ed Himwich)

■ Firmware under developments:

- 512/1024 MHz DDC with 32 MHz sub-bands
- 1 GHz Polyphase Filterbank with 16 x 64 MHz channels

■ Hardware under development

- DBBC3 (DIVA Project Task 2)
 - 4 IFs with 14 GHz input ea (compatible with DBBC2)
- Phase cal tones generator unit

Available software

- DDC: the latest version includes a mode named 'LBA' to have compatible outputs with the Australian terminals. This was required by our Auscope users
- PFB, the latest version includes a 'full flexible' output mode, any converted channel (sign,mag) can be routed to any output channel in the VSI. This for compatibility with the RDBE.
- PFB version includes the full band (called DSC, direct sampling conversion) capability in both 512MHz and 1024MHz bwd.