Interface Control Document

From:

Back End

To:

ACA Correlator

ALMA-50.00.00.00-62.00.00.00-A-ICD

(X) (Y) where X<Y

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A	2004-05-21	all	Draft A	First Draft

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1 Description

1.1 Purpose

This document defines the interface between the ACA correlator (RD 01) and the ACA Backend Subsystem (RD 02).

1.2 Scope

The ACA Correlator includes the DTS Receiver (DTS-R) part with the FO Receiver (FOR) and DTS digital deformatter (see RD 01).

This ICD covers the electrical and mechanical interface requirements of the ACA correlator with ACA Backend Subsystem, in which the interface point A is the optical connector before FOR in DTS-R part, and the interface point B is the electronic interface for the reference clocks of 48 msec and 125 MHz (see figure 1-1).

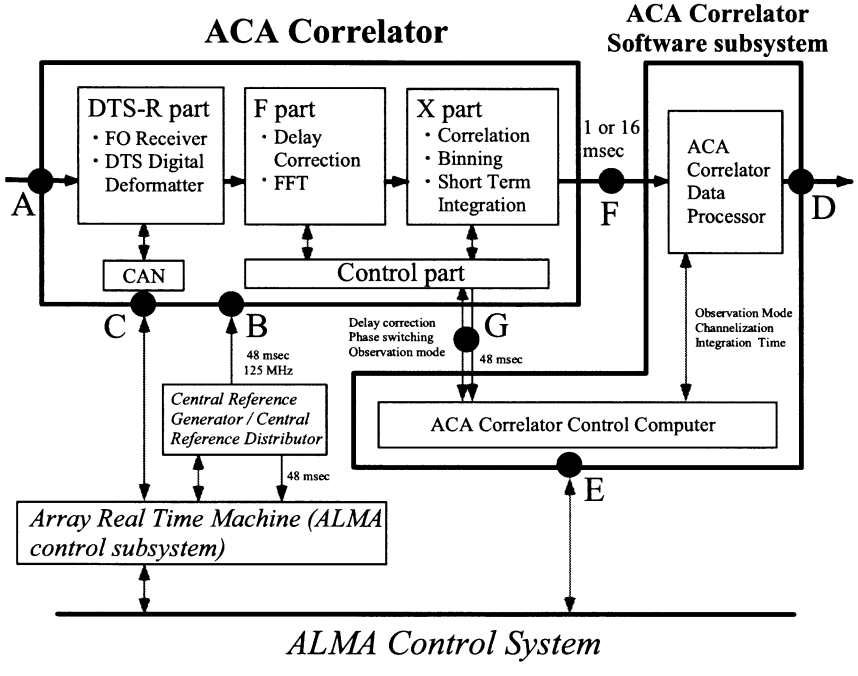

Figure 1-1. The ACA Correlator subsytem.

2 Related Documents and Drawings

2.1 References

No	Document Title	Date	Reference
RD 01	ACA Correlator Technical Specifications	2004-xx-xx	ALMA-J-62.00.00.00-001-A-SPE
RD 02	ACA Backend Subsystem Technical Specifications	2004-xx-xx	ALMA-J-59.00.00.00-001-A-SPE
RD 03	ICD From: BE; To: Correlator	2003-08-11	ALMA-50.00.00.00-60.00.00.00-A-ICD
RD 04	FOR Hardware Description	2004-04-19	BEND-54.08.00.00-001-A-DSN
RD 05	ICD From: Site (AOS Technical Building); To: ACA Correlator	2004-xx-xx	ALMA-20.01.02.00-62.00.00.00-A-ICD
RD 06	ICD From Site (AOS Technical Building); To Backend (Central Equipment)	2004-03-29	ALMA-20.01.02.00-50.00.00.00-A-ICD
RD 07	Digital Transmission System Signaling Protocol	2002-09-06	ALMA memo 420
RD 08	ALMA Monitor and Control Bus AMBSI2 Standard Interface Design Description	2001-05-03	ALMA-70.35.10.02-001-A-MAN

2.2 Abbreviations and Acronyms

RD	Reference Document
NAOJ	National Astronomical Observatory of Japan
ACA	Atacama Compact Array
ESO	European Southern Observatory
NRAO	National Radio Astronomy Observatory
JAO	Joint ALMA Office
ALMA	Atacama Large Millimeter Array
ALMA-B	ALMA Bilateral
ALMA-J	ALMA Japan
SE&I	System Engineering and Integration
eBLC	enhanced Baseline Correlator
IPT	Integration Product Team
BE	Back-End
DTS	Data Transmission System
DTS-R	DTS Receiver
FO	Fiber Optical
CRG	Central Reference Generator
CRD	Central Reference Distributor

3 Physical System Interfaces

64 DTS FOR printed cards for ACA is included in ACA Correlator. These cards are specified in the ACA Correlator (see RD 01), but not different with eBLC (see RD 03). The Correlator will have 192 inputs for the 10 Gbps optical fiber transmission system.

The ACA Correlator will also have inputs for a system 125 MHz clock (from CRG) and 48 msec time tick (from CRD), to be in the first quadrant.

3.1 Optical Interface

The performance specifications conform to those of FOR Hardware in ALMA-B Backend subsystem (see Section 3.1 in RD 04).

The module will convert optical signals to electrical signals with a bit error rate of less than 1 in 10^{10} when the inputs levels are within the specification of section 3.1.2.

3.1.1 Optical Fiber Routing

The requirement and specifications for ACA correlator are the same as those of eBLC (see Section 3.1.1 in RD 03).

3.1.2 Inputs

For correct operation the optical inputs will be in the range 0 dBm to -20 dBm. If the inputs are outside the range +2 dBm to -23 dBm the module will signal a fault to the optical amplifier control system.

3.1.3 Connector

The optical connectors are conform to those of FO receiver Hardware in ALMA-B Backend subsystem (see Section 3.3.1.2.2 in RD 04).

The three optical fiber flying lead inputs terminate in Diamond E-2308.6 blind mate connectors.

3.1.4 Optical Cable

The optical cables from ACA Backend Subsystem (RD 02) to ACA Correlator (RD 01) in AOS technical building would be provided by the ALMA-B Site IPT (or ALMA-B BE IPT). These are also written in RD 05 and RD 06. It is necessary the number of optical cables corresponding to 16 antennas in ACA system.

3.1.5 DTS digital deformatting

DTS digital Deformatter is responsible for decoding the embedded frame information, as described in ALMA memo 420, Digital Transmission System Signaling Protocol, and to determine the quality of the data received.

3.2 Electronic Interface

3.2.1 Reference Clocks

The ACA correlator requires an input sinusoidal reference signal at 125 MHz (from CRG), which will be terminated in 50 Ω. The input signal level will be a minimum of + 10 dBm. The correlator will provide an N type connector receptacle for the 125 MHz clock signal and the back end will provide the mating plug and cable.

The ACA correlator also requires a time tick (from CRD): a single 48 msec system cycle tick with LVDS interface standards that is low for 42 msec and high for 6 msec. The tolerance on this duty cycle is ±1 msec. The leading edge of this signal (low to high) is used by the ACA correlator as the system time reference. The ACA correlator will provide a BNC twinax connector receptacle for the time tick signal and the back end will provide the mating plug and shielded twisted-pair cable.

3.2.2 Clocks

The ACA correlator provides a single +6 dBm (into 50 Ω) sinusoidal 125 MHz clock for each receiver card. Amplitude tolerance of this signal from the ACA correlator is ±1 dB.The clock interface should be terminated on the receiver card with a 50 Ω resistor to ground. The clock signal is synchronous with the LO-supplied 125 MHz correlator clock.

3.2.3 Time Tick

Each receiver card gets a single 48 msec system cycle tick with LVDS interface standards that is low for 42 msec and high for 6 msec. The positive-going transition of this signal is set by the correlator as the system time reference. Tolerance on the high duration of this signal is ± 1 msec. The time tick signal is synchronous with the LO supplied correlator time tick.

3.2.4 Cable

The electronic cables from ACA Backend Subsystem (RD 02) to ACA Correlator (RD 01) in AOS technical building would be provided by the ALMA-B Site IPT (or ALMA-B BE IPT). These are also written in RD 05 and RD 06. It is necessary the number of optical cables corresponding to four quadrants for the reference clock of 48 msec and 125 MHz, respectively.

Data?