Antenna Procurement

**VertexRSI Antenna:**
- Foundation completed by NRAO and subcontractors August 2001
- Currently being erected at ALMA Test Facility (ATF) site
- Joint outfitting of antenna and software testing started in Nov. 2002
- Provisional Acceptance Scheduled for February 2003

**Alcatel-European Industrial Engineering Consortium (AEC) Antenna:**
- Foundation completed January 2003
- Currently being fabricated and shipped
- Metrology Design Review scheduled for February 2002
- Joint outfitting of antenna planned for April to July 2003
- Preliminary acceptance scheduled for May 2003
- Provisional acceptance schedule for July 2003
AEC Antenna

VertexRSI Antenna
**VertexRSI**

- 264 Panels, 8 rings
- Machined AL panels, open back
- 8 adjusters / panel
- 24 CFRP BUS sectors, open back
- Feed legs and Apex in CFRP
- Hexapod Apex Mechanism \((6 - axes)\)
- Invar support cone
- Large cylindrical Invar/steel Rx. Cabin
- Pinion drive
- Base mounted with 3-point connection
- Absolute Encoders
- Mass ~106 tons
  - Elevation structure \(\approx 45\%\)
  - Azimuth structure \(\approx 55\%\)
- 1st Frequency \((\text{locked rotor})\)
  - Elevation \(\approx 7.1\) Hz
  - Azimuth \(\approx 8.0\) Hz

**ALCATEL/ EIE**

- 120 Panels, 5 rings
- Replicated Nickel panels, Rhodium coated, close back
- 5 adjusters / panel
- BUS in CFRP, 16 sectors, close back
- Feed legs and Apex in CFRP
- Three axes Apex mechanism
- Direct connection Cabin BUS
- Cabin in CFRP
- Direct drives on both axes
- 6 Points support base
- Incremental encoders
- Total Mass ~76 tons
  - Elevation structure \(\approx 30\%\)
  - Azimuth structure \(\approx 70\%\)
- 1st Frequency \((\text{locked rotor})\)
  - Elevation \(\approx 10.5\) Hz
  - Azimuth \(\approx 15.9\) Hz
Antenna Procurement

▶ Options

1.) Exercise contract option for production (*Single Source*)
2.) Issues RFP/CFT for antenna designs to specification
3.) Issues RFP/CFT for antenna designs to print
   - Add nine month to start of procurement of the antenna
Antenna Procurement

Scope

– Deliver 63+1 Antennas to Chile \(\text{(Obligations of 31+1 NA, 32 Europe)}\)
  - +1 is retro-fitting of the selected prototype to be identical to production antenna

– Goal of a single design \(\text{(accept possibility of two designs of 32 antennas each)}\)

– Functional specification from current antenna contracts updated for production and delivery to Chile \(\text{(same specification applied in case of two different antenna designs)}\)

– Interface Control Documentation (ICD) will be valid for both antenna designs if different. A common foundation design will be implemented.

– Delivery at Operations Support Facility (OSF)
  - Status of delivery surface accuracy 100 um and 2 arc-sec full sky.
  - Project required to adjust surface to accuracy and calibrate.

Cost

– Antenna Budget for Production Antennas of $183.5m \(\text{(Y2000$)}\)
  - $2.9m each, Year 2000 $, ALMA Work Element #500 & #505
  - Budget in 2004 is $3.4m, Antenna estimated in 2003 to be $3.5m-$4.0m
Antenna Procurement

► Schedule

– 2002Nov  Start of Shared Access of VertexRSI Antenna
– 2003Feb  Provisional Accept VertexRSI Antenna
– 2003May  Start of Shared Access of AEC Antenna (*Preliminary acceptance*)
– 2003Jul  Provisional Acceptance of AEC Antenna

– 2003Apr  Complete Antenna IPT Technical Performance Report on VertexRSI Antenna
– 2003Sep  Complete Antenna IPT Technical Performance Report on AEC Antenna

– 2003Mar  RFQ for VertexRSI Antenna Contract Binding Price Quotation
  » 31+1 and 63+1 option
– 2003Apr  Binding Price Quotation due from VertexRSI
– 2003Oct  Binding Price Quotation due from AEC

– 2003Jun  CFT/RFP Bid Package Submitted to Project Office
– 2003Jul  Issue CFT/RFP for production antennas Design(s)
Antenna Procurement

► Schedule

– 2003Nov  Closing date for CFT/RFP packages
– 2004Jan  Bid Evaluation to Project Office (Competitive tender)

– 2004Jan  Earliest Possible Single Source Contract
  (VertexRSI, pending Antenna Evaluation Group (AEG) performance report)
– 2004May  Sign Production Contracts

– 4Q 2005  First Production Antenna Available in Chile at OSF
– 3Q 2007  Start Early Science Operation (8 fully operation antennas at AOS)
– Q4 2011  Completion of Construction Project
Assumptions

- **Procure lowest cost antenna meeting specifications**
  - Goal to contract to meet specifications as opposed to build-to-print
  - Two separate contracts will be issued at different times
  - Contracts via member countries (North Am. & Euro partners)?
  - Through two parallel procurement activities?
- **Must Meet Project Plan Schedule** *(1st antenna in Chile 4Q2005)*
- **Antenna Validation by AEG prior to signing contract**
- **From antenna vendor selection to signed contract a minimum of about 4 months**
  - Contract and price negotiation ~1 months
  - Funding approval ~2 months *(NRAO→AUI→JAO→NSF→ALMA Board)*
    *(ESO →JAO→Finance Committee→EAC→ALMA Board)*
  - Final price negotiation and sign contract ~1 months
- **Contractor will require 2 years from signing contract to 1st antenna on site in Chile with production proceeding right after of one antenna a month.**
  - Retrofitted Prototype antenna could be deliver within one year of signing contract
  - Most cost effective schedule
  - Contractor needs time to negotiate best production prices from several contractor
  - Setup supply lines and production process that is very efficient *(Advanced Procurement)*
  - Prepare for pre-production reviews
Antenna Procurement

► CFT/RFP Bid Package Contains:

1.) Special Conditions Governing this CFT/RFP
2.) Statement of Work
3.) Technical Specification and Interface Control Documents
4.) As built drawing for VertexRSI and AEC
5.) Description of the terms and conditions of procurement for each executive.