

## National Radio Astronomy Observatory

Charlottesville, Virginia

October 28, 1981

To: J. Marymor

From: A. Shalloway

Subject: Request for Bids for NRAO Data Communications System

Attached is specification #A31800N1 covering a communications system for NRAO. Please assemble a request for bid and send the request to the companies listed on Attachment A.

In addition to the specification requirements, the following notes and information requests should be sent to the vendor with the Request for Bid:

1. For purposes of estimating statistical multiplexor efficiency, it is requested that the bidders supply a detailed description (to the block, byte and bit level) of their multiplexor's synchronous (trunk) output protocol, and a description of any compression techniques used.
2. If a component is supplied which is not manufactured by the bidder, even though it may have his name on it, list the manufacturer and model number.
3. We will add additional leased lines (trunks) between sites if experience or communication expansion dictates the requirement. Therefore, the bidder should explain if his equipment can accommodate or adapt to this expansion. For example, the statistical multiplexor may have a 19.2 Kbps output which can be split between two outputs - each feeding its own modem.
4. If the bidder's capabilities are different than called for in Item 2 of the specifications, these should be explained. For example:
  - A. D1 or C2 conditioning required.
  - B. No adaptive equalization required because of the modem modulation technique.
5. If both Specification Items 3A.a and 3A.b can be accomplished, the bid should be made both ways.
6. It may be that no manufacturer can meet all of the requirements. Therefore, notes on exceptions taken and additional capabilities will be helpful in determining the successful bidder.

7. The switching or routing capability of the proposed system should be described in detail.
8. The Tucson (Table I, Trunk D) option cost should be separated from the rest of the proposed costs.
9. The parts and labor guarantee should be detailed.
10. Installation and checkout should be bid as a separate item.
11. Technical questions should be directed to Arthur M. Shalloway, telephone (804) 296-0332.

This project will be in the range of \$30,000 to \$80,000. We would like to have it operating by February or March of 1982. All of the components necessary to assemble such a system are essentially "off-the-shelf."

Attachments

ATTACHMENT A

Codex Corporation  
1776 K Street, N. W.  
Suite 200  
Washington, D. C. 20006  
Attn: Mrs. L. Marge Dean  
(202) 862-1563

Racal-Milgo Government Systems, Inc.  
1111 19th Street, N. W.  
Suite 600  
Washington, D. C. 20036  
Attn: Mr. James E. Wyatt  
(202) 466-3940

Infotron Systems Corporation  
301 Maple Avenue West  
301 Tower Suite 513  
Vienna, VA 22180  
Attn: Joe Barowich  
(703) 281-1760

Digital Communications Associates  
303 Technology Park  
Atlanta, Norcross, Georgia 30092  
Attn: Mr. Carroll L. Barrett  
(404) 448-1400

Timeplex, Inc.  
4103 Chain Bridge Road  
Suite 110  
Fairfax, VA 22030  
Attn: Mr. John A. Olsen  
(703) 385-3979

Micom Systems, Inc.  
20151 Nordhoff Street  
Chatsworth, CA 91311  
Attn: Mr. Ralph Gillispie  
(213) 882-6890 or  
998-8844

Halcyon  
8375 Dunwoody Place  
Atlanta, GA 30338  
Attn: Mr. Daniel H. Wolfe  
(404) 998-2210

\*\*\*Terminal Networks, Inc.  
3911 Falstone Road  
Richmond, VA 23234  
Attn: Mr. Steve Morrisett  
(804) 271-9400  
(301) 649-6000

\*James L. Highsmith & Co.  
8728 Forest Hill Avenue  
P. O. Box 3187  
Richmond, VA 23235  
Attn: Mr. Eugene Hulbert  
(804) 272-5888

Paradyne Corporation  
700 North Fairfax Street  
Suite 302  
Alexandria, VA 22314  
Attn: Mr. Frank H. Pruitt  
(703) 548-4453

\*\*Data Communications Systems Corp.  
252 North Washington Street  
Falls Church, VA 22046  
Attn: Mr. Dennis Murphy  
(703) 241-7803

Digital Communications Corp.  
11717 Exploration Lane  
Germantown, MD 20767  
(301) 428-5500

Kinex Corporation  
6793 Cross Bayou Drive  
Largo, FL 33543  
Attn: Mr. Mac Green  
(813) 541-6404

Com Design  
751 South Kellogg Avenue  
Goleta, CA 93117  
800-235-6935  
(805) 964-9852

Rixon, Inc.  
2120 Industrial Parkway  
Silver Spring, MD 20904  
Attn: Mr. Bob Swanson  
(301) 622-2121

General Data Con Industries, Inc.  
2000 Century Plaza  
Suite 428  
Columbia, MD 21044  
Attn: Mr. Jack Jonkman  
(301) 596-0888

\*representative of Prentice Corp.

\*\*representative of several companies.

\*\*\*representative of Gandalf Data, Inc.

NATIONAL RADIO ASTRONOMY OBSERVATORY

Charlottesville, Virginia

SPECIFICATION: A31800N1

TITLE: NRAO Data Communications Network

DATE: October 28, 1981

PREPARED BY:

Arthur M. Shalloway  
Arthur M. Shalloway

APPROVED BY:

R. Burns  
R. Burns

1. Introduction

This specification covers a network of data communications between Green Bank, West Virginia; Charlottesville, Virginia; VLA site, New Mexico and Socorro, New Mexico. There is also an option for data communications with Tucson, Arizona. Data terminal equipment (DTE) involved consists of CRT terminals (both text and graphic), IBM computers (both scientific and fiscal), printers, card readers, VAX computers, DEC 10 computers, ModComp computers, word processors (both IBM and A. B. Dick), the capability of expansion to cover Univac computers in VLB and Electronics, Apple and H-P computers in Electronics, and outside observers doing remote processing and observing.

The present planned communications requirements are illustrated in Table I and Figure 1. Included in the table are (\*) additional spare communication links which are to be designed into the hardware. A second set of communication links (\*\*) which can be handled by the system by expanding the hardware with relatively inexpensive plug-in (cards for example) units.

2. Hardware Description

The four trunks, A, B, C, and D, will each be a single leased 4-wire unconditioned line, type 3002. The basic equipment will consist of statistical multiplexors and 9600 bps modems with continuous automatic adaptive equalizers.

3. Required Features

- A. Two methods of handling synchronous data are acceptable; however, item b, below, is more desirable:
  - a. The two synchronous channels (2400 bps and 4800 bps) may be fed into a multiport modem with the statistical multiplexor synchronous output fed into a third 2400 bps port on the modem. In this configuration, the synchronous bit rates (bandwidths) would never be shared with the asynchronous inputs to the multiplexor, so that the maximum synchronous output of the multiplexor would never exceed 2400 bps.

- b. The configuration could be as in item a, above, or the synchronous channels (2400 bps and 4800 bps) could be fed into two of the multiplexor channels. In either configuration, when either synchronous channel is not passing data, the 2400 and/or 4800 bps rate (bandwidth) shall be transferred to be available to the asynchronous data channels, so that the asynchronous total transmitted data rate will be increased to 4800, 7200 or 9600 bps.
- B. Because of Item 4 (described in Trunk A, Table I) some type of switching or routing is required.

#### 4. Desirable, But Not Required Features

- A. There will be as much remote testing as possible. Assuming Charlottesville, Virginia to be the headquarters, the ideal situation would allow an operator in Charlottesville to check every link and block of hardware in the system.
- B. The multiplexor synchronous output to the modem should have a rate up to 19.2 Kbps. There should be two output ports which can share the 19.2 Kbps rate in steps from 0 to 19.2 Kbps.
- C. The aggregate bit rate input (sum of all input channels) to the multiplexor should be 19.2K ps minimum. Any input should be capable of a 9.6 Kbps rate so long as the aggregate rate is not exceeded.

#### 5. Future Add-On Capability

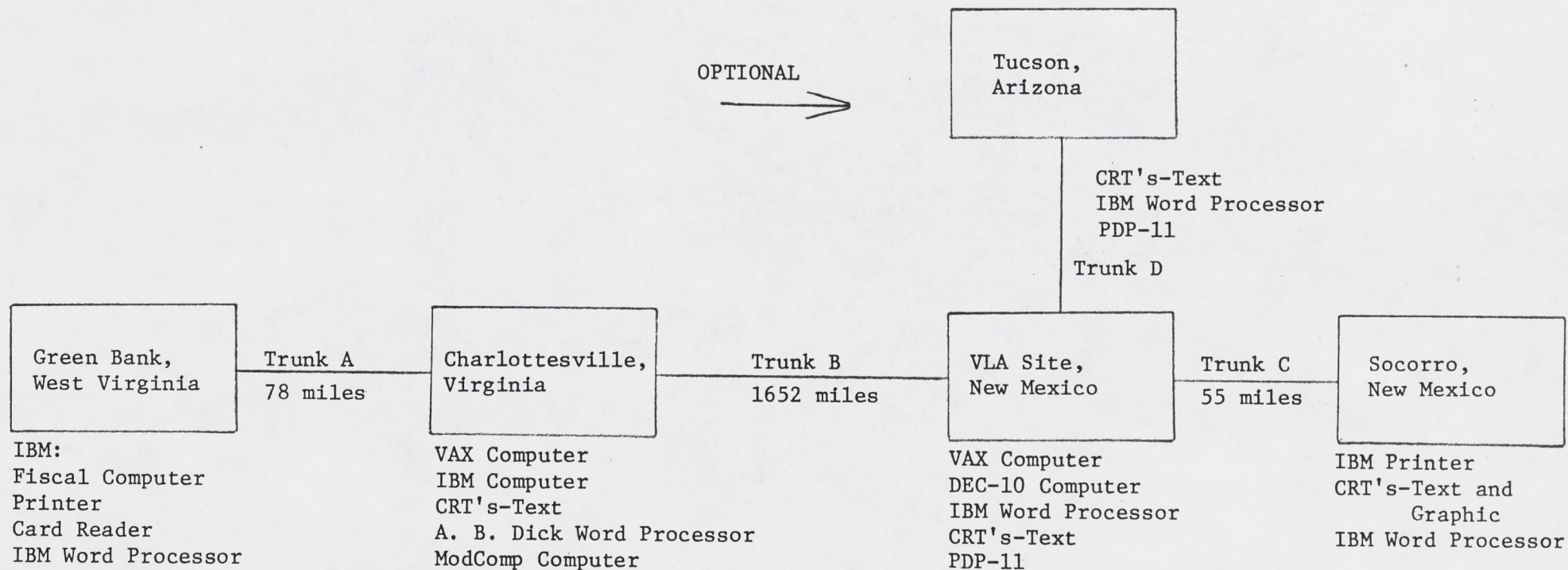
- A. Auto or manual dial-up in case of loss of transmission on the leased lines. This should include fall-back data rates to accommodate the degraded dial-up lines.

TABLE I

<u>LINK COMMUNICATIONS NUMBER</u>	<u>RATE</u>	<u>PROTOCOL</u>	<u>TYPE OF DATA</u>	<u>NO. OF LINKS</u>
<u>TRUNK A</u>				
1. GB-CRT to CV-VAX	4800 bps	Async.	Graphics	1
2. GB-CRT to CV-IBM	1200 bps	Async.	Text	3
3. CV-IBM to GB-Printer/Card Reader	4800 bps	Sync. SNA/SDLC or Bi-sync	Text	1
4. This link will be shared, but not simultaneously, for two purposes as follows:				
A. Soc-feedthrough to GB-fiscal IBM	2400 bps	Sync. SNA/SDLC	Text	1
B. A word processor at any site to a word processor at any other site	2400 bps	Sync. SNA/SDLC	Text	1
**5. CV to GB (unspecified DTE)	1200 bps	Async.		2
<u>TRUNK B</u>				
1. CV-VAX to VLA-VAX	4800 bps	Sync.-DDCMP		1
2. Same as 4B in Trunk A.				1
3. CV-CRT to VLA-DEC 10	1200 bps	Async.	Text	1
4. CV-CRT to VLA-VAX	1200 bps	Async.	Text	1
5. VLA-CRT to CV-IBM	1200 bps	Async.	Text	1
6. VLA-CRT to CV-VAX	1200 bps	Async.	Text	1
*7. CV to VLA (unspecified DTE's)	1200 bps	Async.		1
**8. CV to VLA (unspecified DTE's)	1200 bps	Async.		5

TABLE I

<u>LINK COMMUNICATIONS NUMBER</u>	<u>RATE</u>	<u>PROTOCOL</u>	<u>TYPE OF DATA</u>	<u>NO. OF LINKS</u>
<u>TRUNK C</u>				
1. Soc-CRT to VLA-DEC 10	4800 bps	Asyn.	Graphics	1
2. Soc-CRT to VLA-DEC 10	1200 bps	Asyn.	Text	2
3. Soc-CRT to VLA-ModComps	1200 bps	Asyn.	Text	1
4. VLA-DEC 10 to Soc-Printer	4800 bps	Asyn.		1
5. Same as 4A and B in Trunk A				1
*6. VLA to Soc (unspecified DTE's)	4800 bps	Asyn.		1
**7. VLA to Soc (unspecified DTE's)	1200 bps	Asyn.		1
<u>TRUNK D (Optional)</u>				
1. The link will be shared, but not simultaneously, for two purposes as follows:				
A. Same as 4B in Trunk A.				----- 1
B. TUC-PDP-11 to VLA-PDP-11	2400 bps	Sync.-DDCMP		
*2. TUC-VLA (unspecified DTE's)	1200 bps	Asyn.		2
**3. TUC-VLA (unspecified DTE's)	1200 bps	Asyn.		1



CRT's:  
Text  
Graphic

NOTES: Trunks consist of one (1) each leased unconditioned 4-wire, type 3002, line. Mileages given are tariff mileages.

NRAO DATA COMMUNICATIONS NETWORK

Figure 1

A. M. Shalloway  
10/28/81