

The E-Configuration of EVLA: Constraints for Reconfiguring from A to E and from E to D configuration.

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1 Introduction

The latest design of the new most compact E-configuration of VLA has been finished. The 27 antennas will be located in the central part of D configuration inside an ellipse of 300x250 meters. Eleven antennas will be located on existing pads of the central part of the D configuration. The other 16 antennas will be located on both sides of the existing track in the North-East sector of wye, and on both sides of the new track in the North-West sector of wye. The antennas will be located $\geq 27\text{m}$ off the west side of the tracks and $\geq 12\text{m}$ off the east side of the tracks. Such an asymmetric positioning allows getting more space for new antennas, but at the same time puts additional restrictions on the reconfigurations to and from E-configuration. The diagram of the antenna locations together with the tracks is given in fig 1. The plan for the recommended reconfiguration is given in this memo.

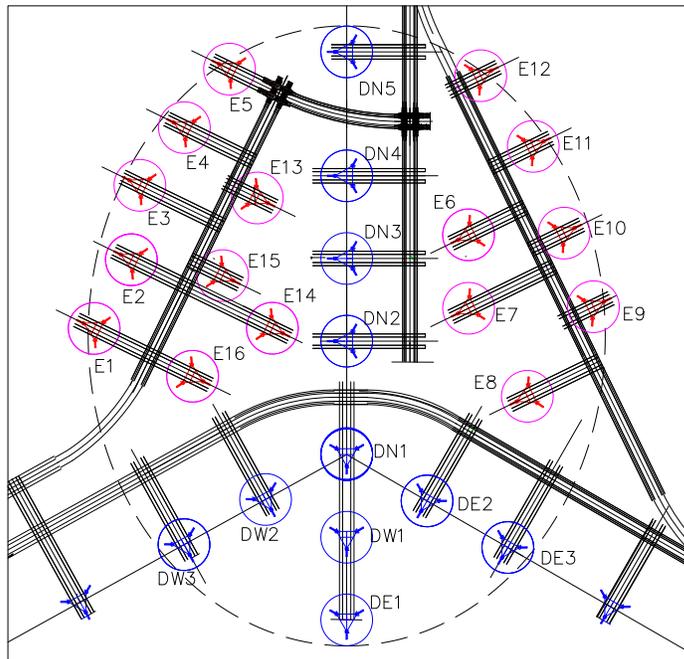


Figure 1: Antenna locations with the tracks. 11 D configuration antenna pads are in the blue circles. 16 new antenna pads are in the red circles. The existing track is at the North-East sector of wye. The new track is at the North-West sector of wye.

2 The position of the E-configuration's antennas

The positions of the antennas are given in table 1. The first eleven rows of the table are coordinates of the VLA-D configuration's pads which will be used in the E-configuration. The right most column of the remaining 16 rows gives the sequential number of the delivered antenna. **The labeling of these pads (E1-E16) is not related with the East arm of VLA.** The Y axis is directed along the North arm of VLA. The X axis is perpendicular to Y axis. The origin of coordinates is at the lower left corner of the frame. The given XY coordinates of antenna DN1 should be subtracted off the given coordinates of all antennas to get their coordinates relative to DN1.

Table 1: The positions of E-configuration's antennas

N	X, m	Y, m	Name
1	200.0	142.59	DN1
2	200.0	197.45	DN2
3	200.0	237.45	DN3
4	200.0	277.45	DN4
5	200.0	337.41	DN5
6	200.0	102.59	DW1
7	200.0	62.59	DE1
8	238.84	120.16	DE2
9	277.88	97.62	DE3
10	160.77	120.85	DW2
11	121.34	99.00	DW3
	End of VLA-D antennas		
12	77.88	203.60	E1
13	95.90	236.85	E2
14	100.01	272.84	E3
15	121.51	300.76	E4
16	143.34	329.06	E5
17	258.90	248.90	E6
18	258.91	213.35	E7
19	287.33	170.78	E8
20	319.29	214.11	E9
21	305.11	249.71	E10
22	290.21	291.67	E11
23	264.80	325.87	E12
24	156.77	266.72	E13
25	164.07	203.70	E14
26	140.02	229.17	E15
27	125.48	180.46	E16

3 Plan of reconfiguration from E to D and from A to E configuration

Currently the reconfiguration cycle of the VLA proceeds as $D \Rightarrow C \Rightarrow B \Rightarrow A \Rightarrow D$. Having added E configuration, we consider the new cycle: $E \Rightarrow D \Rightarrow C \Rightarrow B \Rightarrow A \Rightarrow E$. So we need to look at the two new reconfigurations: $E \Rightarrow D$ and $A \Rightarrow E$. Standing on E configuration we have 11 antennas of D configuration as a part of E. We need to send 6 antennas to the outlying pads of the West (W) arm of

VLA-D, 6 antennas to the outlying pads of the East (E) arm of VLA-D, and 4 antennas to the outlying pads of the North (N) arm of VLA-D. The reconfiguration plan for E to D is shown at the table 2. To reconfigure $A \Rightarrow E$, we **must** first to populate the reconfiguration plan for the 11 pads of E configuration which coincide with D configuration and then populate the new E configuration pads. The total plan of reconfiguration A to E is shown in the table 3. The current East-North and new West-North tracks are

Table 2: Plan of reconfiguration from E to D

From	E16	E15	E14	E13	E12	E11	E10	E9
To	DW9	DW8	DW7	DW6	DW5	DW4	DE9	DE8
Route	W	W	W	W	N-W		N-W-E	

From	E8	E7	E6	E5	E4	E3	E2	E1
To	DE7	DE6	DE5	DE4	DN9	DN8	DN7	DN6
Route	E	E	E	N-E	N	N	N	N

N-E means: pick up the antenna, move to North, deliver to the pad at East

N-W-E means: pick up the antenna, move to North, move to West, deliver to the pad at East

N-W means: pick up the antenna, move to North, move to West, deliver to the pad at West.

Table 3: Plan of reconfiguration from A to E.

To 11 D configuration's antennas of E

From	AE1	AW1	AN1	AW2	AW3	AE2	AE3	AN2	AN3	AN4	AN5
To	DE1	DW1	DN1	DW2	DW3	DE2	DE3	DN2	DN3	DN4	DN5
Route	E-S	W-S	N-E-W-S	W	W	E	E	N	N	N	N

E-S means: pick up the antenna at East, move to center, deliver to the pad at South

W-S means: pick up the antenna at West, move to center, deliver to the pad at South

N-E-W-S means: pick up the antenna at North, move to East, West, South

To 16 new E configuration's antennas

From	AN6	AN7	AN8	AN9	AE4	AE5	AE6	AE7
To	E1	E2	E3	E4	E5	E6	E7	E8
Route	N	N	N	N	E-N	E	E	E

From	AE8	AE9	AW4	AW5	AW6	AW7	AW8	AW9
To	E9	E10	E11	E12	E13	E14	E15	E16
Route	E-W-N		W-N		W	W	W	W

E-N means: pick up the antenna at the East arm, move to the North, deliver to the pad

E-W-N means: pick up the antenna at the East, move to West, move to North, deliver to the pad

W-N means: pick up the antenna, at the West, move to the North, deliver to the pad

open for moving for the transporter without an antenna on board. But they may be blocked if an antenna is on board. So the sequence of antenna delivery described at the tables 2, 3 is strongly recommended. On the other hand special caution should be taken at the consideration going by transporter to pick up another antenna. For example, having delivered antenna to E5 (see table 3) , we need to send the transporter to the East arm to pick up antenna at AE5. We can not send the transporter to south-west and then to the East arm because the load platform will appear at the opposite side of the East arm. Instead we need to send the transporter to north, then to south-east getting the load platform of the

transporter at the right side of the East arm.

4 The stretched E-Configuration of EVLA

The stretched E-Configuration of EVLA is planned to be used for sources with high negative declination (such as the Galactic center) providing a better circular beam. This configuration will include several antennas located at North near the Y axis (both sides). The reconfiguration from A to the stretched E **must** be started with populating of this north group. The west antennas of this group should be taken from the North arm of the A configuration or using the existing E-N track. The east antennas of this group should be delivered using the new W-N track. Having finished filling out the north group of the stretched E configuration, the rest of the E configuration pads should be filled out following the plan described above.

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