

Status of the EDGES Antenna at the Site After Deployment of November 2013

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November 13, 2013

Description

These slides present information about the EDGES antenna deployed in November 2013, relevant for simulation, calibration, or correction of EDGES data.

The best antenna tuning was found under the following conditions:

1. The inter-panel capacitors are orientated vertically.
2. The height of the top plate from the antenna panel is 5 mm, as shown in Figure 1. This value is known only to within 1 mm since the top plate is not flat, and is not perfectly parallel to the antenna panel.
3. There is no nylon washer between the top plate and the brass pipe, only air, see Figure 1. The reason for this is that the washer does not fit when the best antenna tuning is achieved.
4. The height of the tuner capacitor of the balun, measured from the base plate to the top of the upper metal plate of the capacitor, is 31.7 cm. See Figure 2.
5. The tuner capacitor has only quartz dielectric, no teflon. The size of the quartz is 1" x 0.75" x 0.2". It is aligned along the line connecting the brass pipes. See Figure 2.
6. The size of the ground plane is 5.8 m \times 5 m.
7. The main active panel of the antenna is pointing to the hut, which corresponds to 7° east of due north.
8. It was not possible to connect directly the antenna to the LNA using only a 3" cable. Therefore, a 3.5-mm air dielectric adapter was inserted between the cable and the LNA input. See Figure 5.

Height of Top Plate

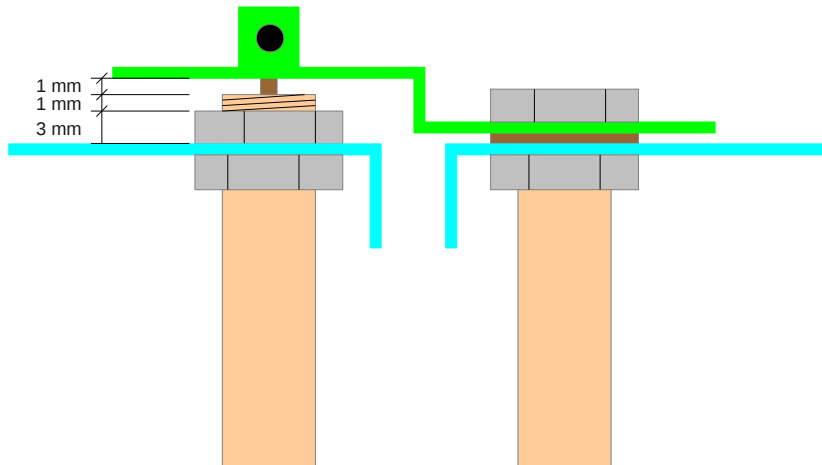


Figure: (1) Height of the top plate with respect to the antenna panel is 5 mm, as measured in the field after the final tuning. The plate is not exactly parallel to the panel, and therefore the height is constant to 1 mm. The height of the nut, pipe, and air dielectric, are also best estimations. In particular, the nylon spacer between the brass pipe and the top plate was too thick and needed to be removed to achieve the best tuning (see Figure 4). Therefore, only air dielectric is left in place.

Height of Tuner Capacitor

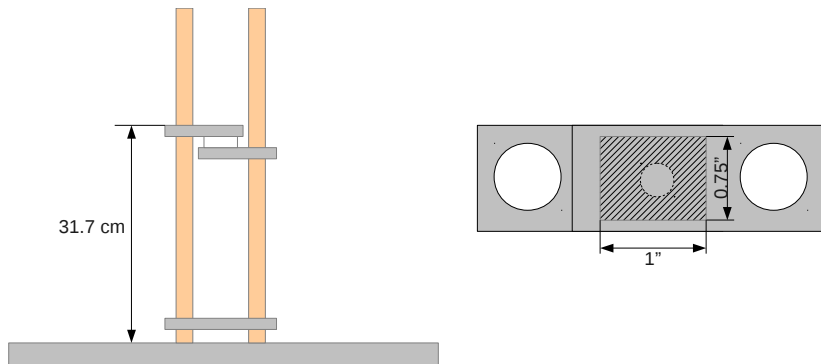


Figure: (2) (*left*) Height of tuner capacitor measured from base plate, and (*right*) orientation of the quartz dielectric. The size of the quartz piece is 1" x 0.75" x 0.2".

Antenna Orientation

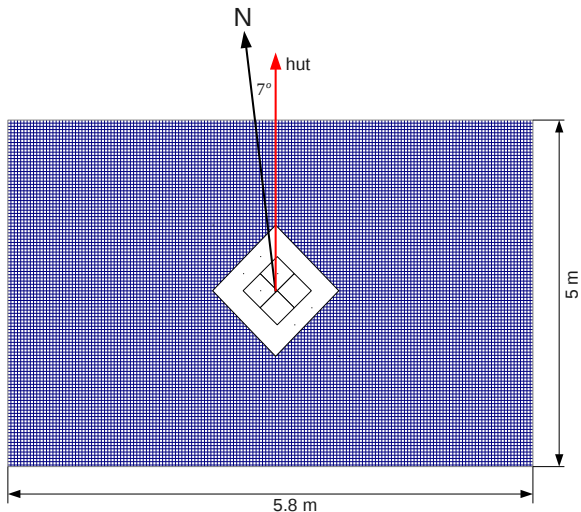


Figure: (3) Size of ground plane, and orientation of the active panels of the antenna with respect to the hut and due north.

Reflection Coefficient of Antenna

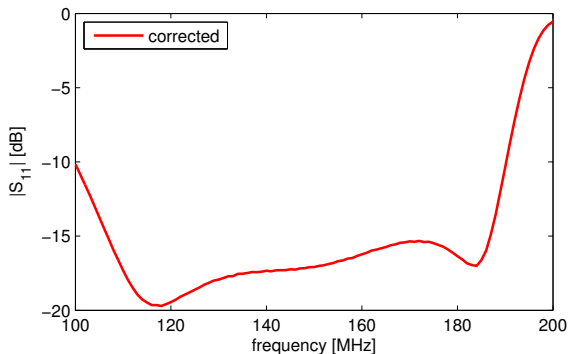


Figure: (4) Typical corrected reflection coefficient of the antenna plus 3" cable. The data file can be downloaded from http://loco.lab.asu.edu/memos/edges_reports/typical_antenna_s11.txt. The format is: frequency [MHz], magnitude [linear], phase [degrees].

S-parameters of 3.5-mm adapter

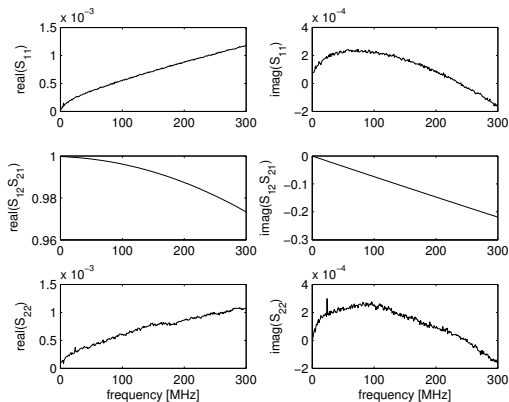


Figure: (5) S-parameters of adapter connected to the input of the LNA in order to reach the 3" cable. They had been measured previously in the lab with the Agilent E5072A VNA. Port 1 is the one facing the antenna, and Port 2 is connected to the LNA. The data file can be downloaded from

http://loco.lab.asu.edu/memos/edges_reports/adapter35.txt. The format is: frequency [MHz], real(S11) [linear], imag(S11) [linear], real(S12S21) [linear], imag(S12S21) [linear], real(S22) [linear], imag(S22) [linear].