

# 4 Introduction to RET Antenna Line Devices

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## About This Chapter

The RET antenna line devices consist of RET antennas, feeders, jumpers, RCUs, SBTs, AISG control cables, BTs, and splitters.

### 4.1 RET Antennas

The tilt of RET antennas can be adjusted with the phase shifter that can be adjusted mechanically.

### 4.2 Feeders and Jumpers

Feeders and jumpers are cables that connect the antenna to the base station. The commonly-used cables are 1/2" jumpers, 7/8" feeders, and 5/4" feeders.

### 4.3 RCUs

Receiving control signals sent from the NodeB, the Remote Control Unit (RCU) starts the step motor and adjusts the tilt of the antenna by controlling the phase shifter through the drive system. The RCU has a control port, that is, an RS485 port.

### 4.4 SBTs

The Smart Bias-Tee (SBT) provides DC power and control signals for the RCU through a feeder. The SBT is mounted on the side of the RET antenna.

### 4.5 AISG Control Cable

The AISG control cable is a signal cable between the RCU and the SBT (or the STMA). The cable connected to the SBT is 0.5 m long. The cable connected to the STMA is 2 m long.

### 4.6 BTs

The BT is a passive component to couple the DC power or OOK signals into a feeder.

### 4.7 Splitters

The splitter splits sectors. It can split the RF signals, RET control signals, and DC signals that are sent from the base station into multiple paths and then transmit them to devices of the antenna system in the corresponding sectors.

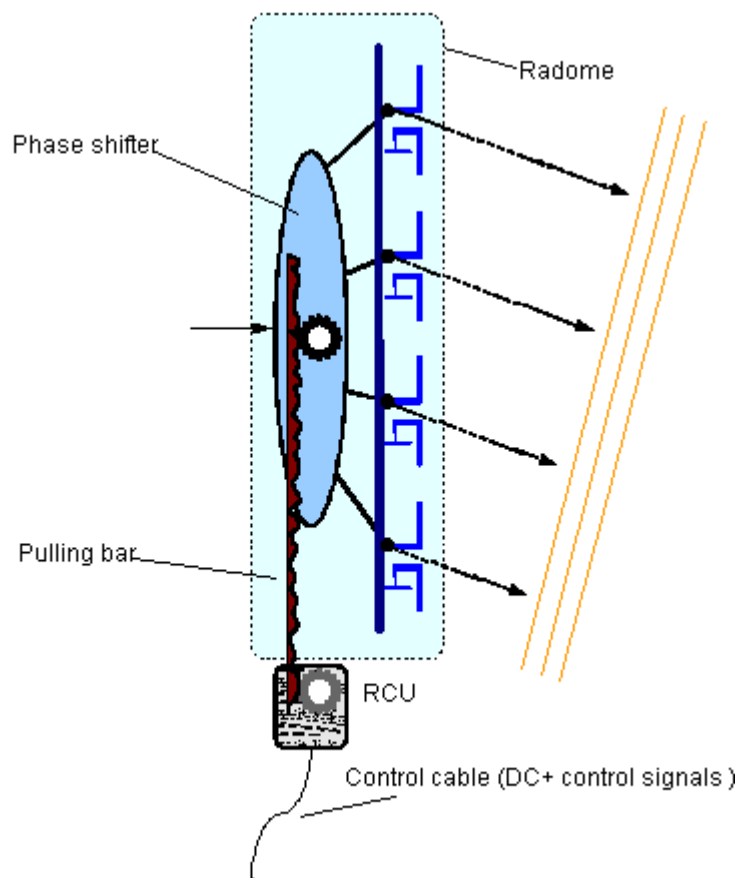
## 4.1 RET Antennas

The tilt of RET antennas can be adjusted with the phase shifter that can be adjusted mechanically.

### Working Principles of RET Antennas

The RET antennas can be controlled remotely using the Remote Control Unit (RCU).

**Figure 4-1** Working principles of RET antennas



The RCU consists of a step motor, control board, and drive system.

- The step motor is usually controlled digitally.
- The control board receives command from the NodeB and drives the step motor.
- The drive system has a gear that bites the pulling bar. When the gear is driven by the step motor, the gear pulls the pulling bar to change the tilt.

### Benefits and Limitations of RET Antennas

Benefits:

- The operator can remotely and quickly handle multiple stations. The cost of network optimization and maintenance is saved.

- The operation is not affected by bad weather.
- The trouble of visiting high-security sites is avoided. This is especially beneficial in scenarios when you need to obtain consent for visiting certain sites, for example, sites that are located inside important government institutes.
- When the tilt is large, the coverage pattern is not distorted, and the interference to the neighboring cell is not significant.

Limitations:

- The RET antenna system is complicated and has lower reliability than the mechanical tilt.
- The cost of the RET antenna system is relatively high.

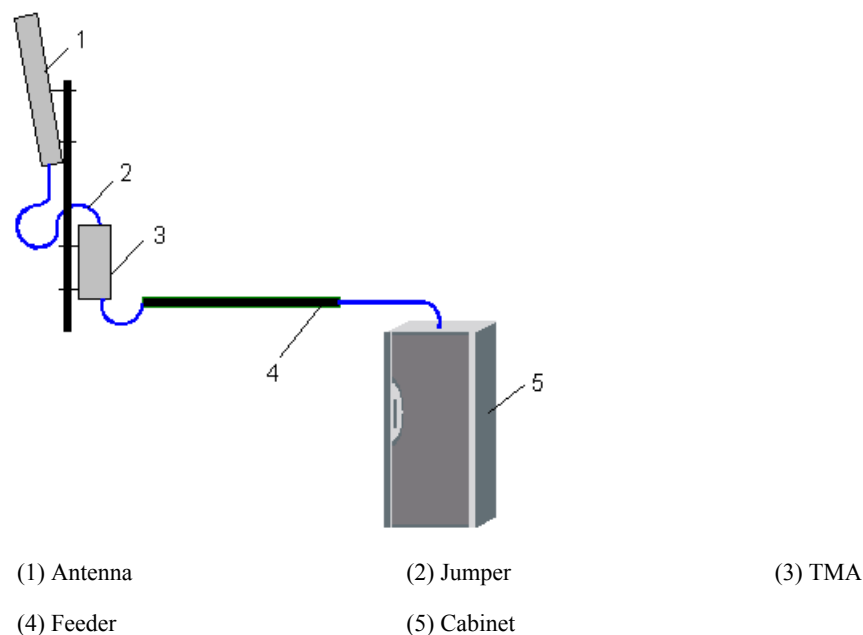
## 4.2 Feeders and Jumpers

Feeders and jumpers are cables that connect the antenna to the base station. The commonly-used cables are 1/2" jumpers, 7/8" feeders, and 5/4" feeders.

- The jumper has a large flexibility but high loss. It is used in short-distance cabling between the TMA and the feeder or between the TMA and the antenna.
- The feeder has a large hardness but low loss. It is used in long-distance cabling.

**Figure 4-2** shows the connections of the feeder and jumpers in the antenna system.

**Figure 4-2** Connections of the feeder and jumpers in the antenna system



- Jumper
- The jumper is installed between the TMA and the feeder, between the TMA and the antenna, between the feeder and the base station, or between the BT and the base station.
- Most jumpers have a predefined length. The jumper between the feeder and the base station or between the BT and the base station, however, must be shortened and installed with connectors according to the actual conditions on site.

If ...	Then ...
The jumper is between the antenna and the TMA.	It has a fixed length of 2.5 m.
The jumper is between the feeder and the TMA.	It has a fixed length of 1.5 m.

If the distance between the antenna and the base station is shorter than 14 m, you may use the feeder to connect the antenna to the base station.

The commonly-used jumpers are 1/2" jumpers.

- Feeder

The commonly-used feeders are 7/8" feeders or 5/4" feeders, depending on the distance between the antenna and the base station.

**Table 4-1** Choosing proper feeders

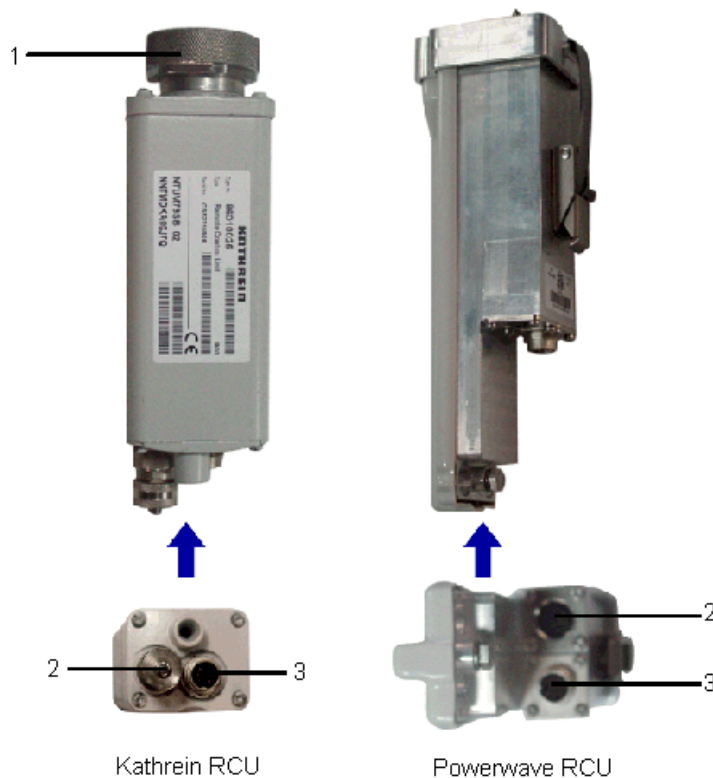
If the distance between the antenna and the base station is ...	Choose ...
More than or equal to 14 m and less than 50 m	7/8"
More than or equal to 50 m	5/4"

## 4.3 RCUs

Receiving control signals sent from the NodeB, the Remote Control Unit (RCU) starts the step motor and adjusts the tilt of the antenna by controlling the phase shifter through the drive system. The RCU has a control port, that is, an RS485 port.

Huawei provides two types of RCUs: Kathrein RCU and Powerwave RCU. [Figure 4-3](#) shows both the RCUs.

**Figure 4-3** Kathrein RCU and Powerwave RCU



- (1) Connector: connected to the antenna
- (2) 8-pin AISG female connector: used to cascade RET antennas. This connector is not used.
- (3) 8-pin AISG male connector: used to connect the signal cable of the RET antenna



## CAUTION

- Waterproof treatment is not required for the two connectors shown in part 2 of [Figure 4-3](#).
- The RET antennas and the RCUs of different vendors are not compatible with each other.
- The Powerwave RCU is assembled with the RET antenna before delivery. [Figure 4-3](#) does not show the connection between the antenna and the RCU.

The RCU should be mounted on the RET antenna before the RET antenna is installed on the pole.

## 4.4 SBTs

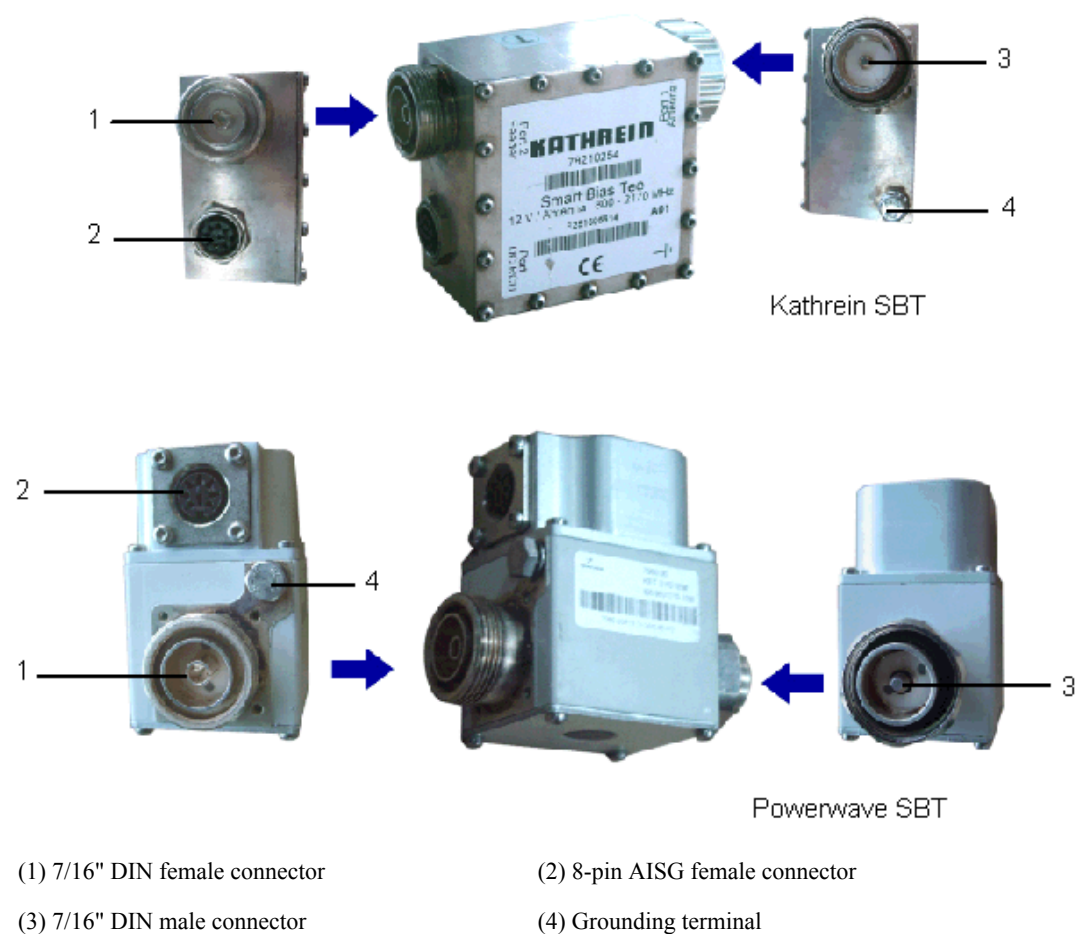
The Smart Bias-Tee (SBT) provides DC power and control signals for the RCU through a feeder. The SBT is mounted on the side of the RET antenna.

The main functions of the SBT are:

- Converting OOK control signals from the feeder into RS485 signals, and sending the RS485 signals to the RCU
- Converting RS485 signals from the RCU into OOK signals, and sending the OOK signals to the feeder
- Sending RF signals from the feeder to the antenna and control signals from the feeder to the RCU.
- Transferring DC power from the feeder to the RCU

Huawei provides two types of SBTs: Kathrein SBT and Powerwave SBT. **Figure 4-4** shows both the SBTs.

**Figure 4-4** Kathrein SBT and Powerwave SBT



## 4.5 AISG Control Cable

The AISG control cable is a signal cable between the RCU and the SBT (or the STMA). The cable connected to the SBT is 0.5 m long. The cable connected to the STMA is 2 m long.

The two ends of the AISG control cable that connects the RCU and the SBT (or the STMA) are:

- 8-pin AISG male connector
- 8-pin AISG female connector

## 0.5-m-Long AISG Control Cable

**Figure 4-5** shows the 0.5-m-long AISG control cable.

**Figure 4-5** 0.5-m-long AISG control cable



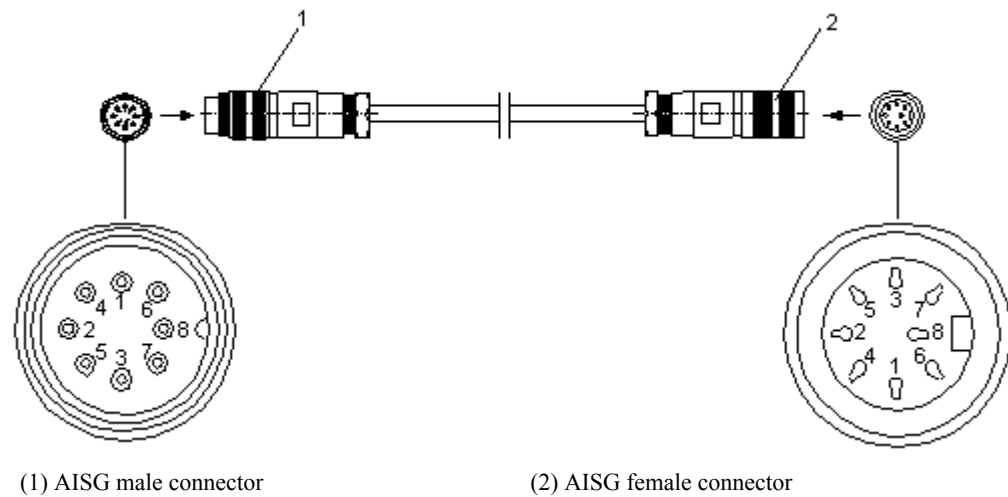
## 2-m-Long AISG Control Cable

**Figure 4-6** shows the 2-m-long AISG control cable.

**Figure 4-6** 2-m-long AISG control cable

## 15-m-Long AISG Control Cable

**Figure 4-7** shows the 15-m-long AISG control cable.

**Figure 4-7** 15-m-long AISG control cable

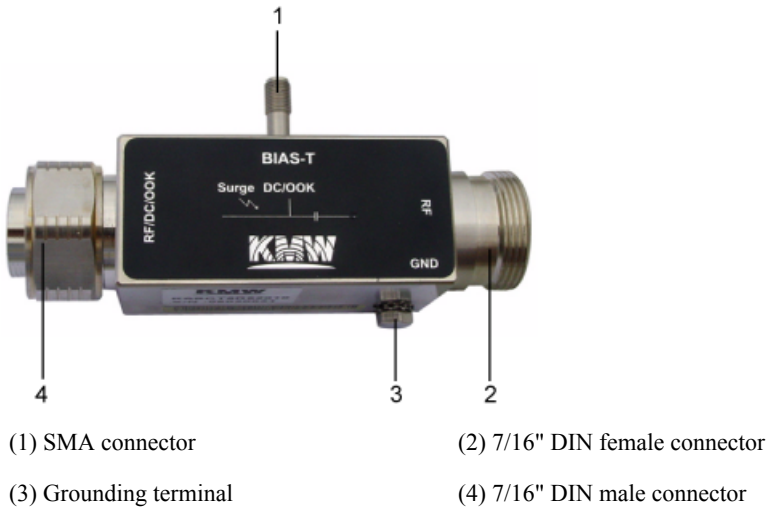
## 4.6 BTs

The BT is a passive component to couple the DC power or OOK signals into a feeder.



Figure 4-8 shows the BT.

Figure 4-8 BT



The number of BTs varies according to the feeding modes of the STMA, TMA, and SBT. Table 4-2 describes the relation between the BT quantity and the components of the antenna system.

**NOTE**

The BT transmits DC signals and RF signals, and the OOK BT transmits DC signals, RF signals, and OOK signals. The RET antenna system must use the OOK BT.

Table 4-2 Relation between the BT quantity and the antenna system components

Antenna System Components	Quantity of BTs to Be Installed
TMA	Two BTs
STMA that receives power supply from two ports	Two BTs
STMA that receives power supply from one port	One BT
SBT	One BT

## 4.7 Splitters

The splitter splits sectors. It can split the RF signals, RET control signals, and DC signals that are sent from the base station into multiple paths and then transmit them to devices of the antenna system in the corresponding sectors.

The three types of splitters are: 1-for-2, 1-for-3, and 1-for-4. Splitters of different types have different connectors and power. Figure 4-9 shows a 1-for-3 Kathrein splitter.

**Figure 4-9** 1-for-3 Kathrein splitter

(1) Output connector: 7/16" DIN female connector

(2) Input connector: 7/16" DIN female connector