

Fiber Optic Link

The AFL3430 transmitter can be configured to work with one, two, three or possibly four receivers, thus saving you the expense of multiple transmitters. The ability of the transmitter to work with multiple receivers depends on the cable configuration. This Product Note details factors you need to know to successfully implement the link with one or more receivers.



Requirements for Successful Link

Referring to the diagram on the next page, there are three constraining factors to implement the AFL3430 link successfully :

1. The net RF gain applied to the GPS signal seen at the AFL3430 transmitter input must be greater than $31 + (2 * \text{OpticalLoss})$ dB, i.e.:

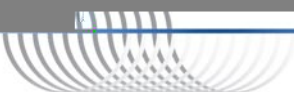
$$\text{AntGain} - \text{CopperLoss1} + \text{G-LNA2Gain} - \text{CopperLoss2} > 31 \text{ dB} + (2 * \text{OpticalLoss}) \text{ dB}$$

2. The net Optical Loss, which includes the Fiber Loss and installed Splitter Loss, between the AFL3430 transmitter and receiver must be less than 12 dB, i.e.:

$$\text{OpticalFiberLoss} + \text{OpticalSplitterLoss} < 12 \text{ dB}$$

3. The net RF gain applied to the GPS signal seen at the GPS receiver input must be greater than +15 dB, i.e.:

$$\text{AntGain} - \text{CopperLoss1} + \text{G-LNA2Gain} - \text{CopperLoss2} + \text{LinkGain} - (2 * \text{OpticalLoss}) + \text{G-LNA2Gain} - \text{InterConnectCopperLoss} > 15 \text{ dB}$$



Example Configuration

This example meets the requirements listed above. The configuration includes a G-LNA2 pre-amp in the antenna downlead path, with 1-foot and 100-foot Belden 9104 downlead cables, along with 5 km of fiber and a 2:1 optical splitter. There is also a 3-foot Belden 9104 interconnect cable between the AFL3430 receiver output and the GPS receiver:

Gain Elements:

Antenna Gain	=		=	+40 dB,
AFL3430 Link Gain	=		=	+22 dB
First G-LNA2 Gain	=		=	+26 dB
Second G-LNA2 Not Installed				

Loss Elements:

DownLead Copper1 Loss	=	1 ft.	=	-0.1 dB
DownLead Copper2 Loss	=	100 ft.	=	-10 dB
Optical Fiber Loss	=	5 km	=	-3 dB
Optical Splitter Loss	=	2:1	=	-4 dB
InterConnect Copper Loss	=	3 ft.	=	-0.3 dB

Rule 1: $40 - 0.1 + 26 - 10 = 55.9 \text{ dB}$, which is $> 31 + (2 * (3 + 4)) = 55 \text{ dB}$ ✓

Rule 2: $3 + 4 < 12 \text{ dB}$ ✓

Rule 3: $40 - 0.1 + 26 - 10 + 22 - (2 * (3 + 4)) - 0.3 = 63.6 \text{ dB}$ which is $> 15 \text{ dB}$ ✓