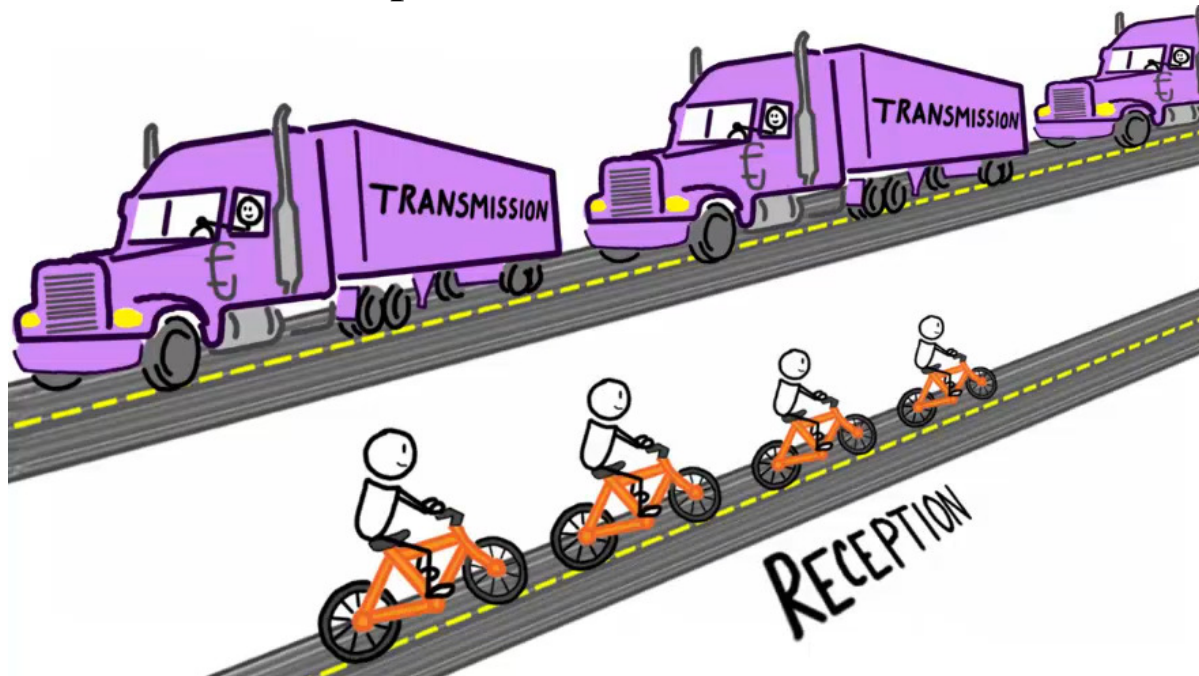


An Introduction to Duplexers.



Duplexers are filters used to isolate signals from one another. They are the simplest form of a multiplexing filter and, as the name implies, consist of two individual filters connected together on one end and feeding separate ports on the other. Like doorways keyed to a specific individual, each filter passes a particular band and blocks all others. They can be designed around almost any two bands, but they are most often used to isolate transmit and receive signals in cell phones. Because transmit signals are billions of times larger than receive signals, duplexers must be optimized to isolate small, sensitive signals from larger, robust ones; the “big/little” problem. The cost of these devices varies from \$0.10 to over \$1.00 and is most heavily dependent on the bandwidth of the two signals, the distance in frequency between transmit and receive bands and the proximity of other interferences. In the hierarchy of all filters, duplexers used in cell phones tend to be at the top end of the performance curve and require special materials and processes to achieve high performance in a small size. The migration of cellular systems to 4G increased the performance requirement to the point where only four manufacturers are capable of providing these components in volume: Avago, Murata, Qorvo, and Skyworks. The advent of complex carrier aggregation will extend this trend and likely reduce the field even further.

We’ve created a short video illustrating the reasons we need duplexers and their impact on mobile communication. Our primary focus in this presentation is to reduce a complex concept to a digestible narrative rather than provide a comprehensive description of the details of duplexers. Ideally, this tutorial will allow investors to understand how and why duplexers are essential in 4G phones.

<https://www.youtube.com/watch?v=xLFr5Xps6kc>

<http://www.charterequityresearch.com/Videos/tabid/119/Default.aspx>

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