

## Speed and Duplex Matrix

### Speed/Duplex

One major issue with Ethernet connectivity is proper configuration of speed and duplex. There is a significant amount of misunderstanding in the industry as a whole regarding the auto-negotiation standard. The speed can be sensed, but the duplex setting is negotiated. This means that if a device with fixed speed and duplex is connected to a device in auto-negotiation mode, the auto-negotiating device can sense the other device's speed and match it. But the auto-negotiating device cannot sense the other device's duplex setting; the duplex setting is negotiated. Therefore, the auto-negotiating device always goes to half duplex in this scenario. The following table is provided as a quick reference for how speed and duplex settings are determined and typically configured. It is imperative that the speed and duplex settings be configured properly.

Device1 configuration	Device2 configuration	Result
auto-negotiate	auto-negotiate	100/full expected and often achieved, but not always stable. Suitable for user PC connections, but not suitable for server connections or uplinks. May be suitable for a single VoIP call, such as with a softphone. Not suitable for multiple VoIP calls, such as through a MedPro board.
auto-negotiate	100/half	100/half stable. Device1 senses the speed and matches accordingly. Device1 senses no duplex negotiation, so it goes to half duplex.
auto-negotiate	10/half	10/half stable. Device1 senses the speed and matches accordingly. Device1 senses no duplex negotiation, so it goes to half duplex.
auto-negotiate	100/full	Device1 goes to 100/half, resulting in a duplex mismatch – undesirable. Device1 senses the speed and matches accordingly. Device1 senses no duplex negotiation, so it goes to half duplex.
100/full	100/full	100/full stable. Typical configuration for server connections and uplinks.
10/half 100/half	10/half 100/half	Stable at respective speed and duplex. Some enterprises do this on user ports as a matter of policy for various reasons.

Table 1: Speed/duplex matrix

Layer 1 (L1) errors such as *runts*, *CRC errors*, *FCS errors*, and *alignment errors* often accompany a duplex mismatch. If these errors exist and continue to increment, there is probably a duplex mismatch or cabling problem or some other physical layer problem.