What impact does window size have on throughput?

When two devices are communicating over IrDA, they must both take turns "owning" the link. In a typical situation, one device is sending data to another. The sending device must allow the receiving device to briefly own the link between each burst of data. This process is called "link turn around". If the amount of time spent turning the link around is significant, performance is reduced.

By increasing the window size, a larger burst of data can be sent without turning the link around. This tends to increase performance. Depending on the capabilities of the two infrared devices, window size may increase throughput by as much as 245%, or it may have no effect at all.

Several factors come into play to determine the throughput increase:

Factor one: Do both devices support higher window sizes?

If device X supports window sizes greater than one, and device Y does not, a conversation between X and Y cannot take advantage of larger window sizes.

Factor two: What is the negotiated baud rate?

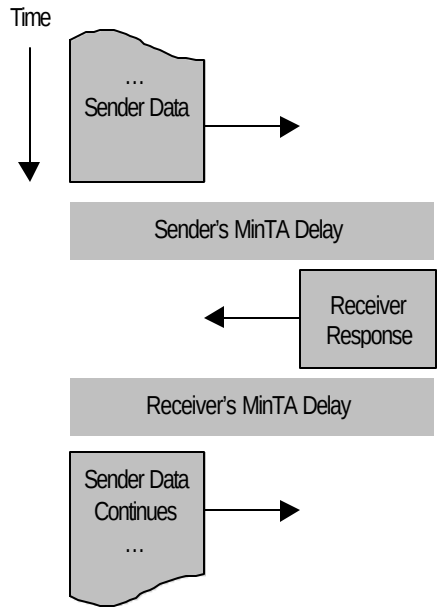
Increased window size has almost no effect on throughput at 115 kbps or lower speeds. At 512 kbps speeds and higher, window size becomes more important.

Factor three: What is the average turn around time?

Larger window sizes are especially helpful when the link's average turn around time is higher. The diagram at right shows the sequence of events during link turn around:

1. The sender completes its data transmisson.
2. The receiver waits for the negotiated minimum turn around time (MinTA) required by the sender.
3. The receiver transmits an RR frame to indicate that it is ready for more data.
4. The sender waits for the negotiated MinTA required by the receiver.
5. The sender begins its next data transmission.

For example, for two devices that each require a 5 ms MinTA and can transmit at 4 mbps, the average link turn around will take at least 10.052 ms (5 ms for each MinTA time and 52 microseconds for the RR response).



Putting it all together

The maximum possible IrLAP throughput can be calculated using the following formula:

b = IrLAP data bytes per frame (usually 2048)
f = Time to send a single frame (4.148 ms at 4 mbps speeds)
k = Average link turn around time
w = Window size

IrLAP throughput = $b * w / (f * w + k)$

The table below shows a typical application of this formula. The figures in the table below assume a 4 mbps transfer speed (2048 IrLAP data bytes transferred in 4.148 ms).

Note: Observed data throughput rates will be somewhat lower due to overhead from higher-layer protocols (such as IrLMP, IrCOMM, and IrOBEX).

Device 1's MinTA	Device 2's MinTA	Window size 1 throughput	Window size 7 throughput	Percent increase
10 ms	10 ms	83 KBytes/Sec	286 KBytes/Sec	245%
5	5	141	359	154%
5	1	197	400	103%
1	1	325	451	39%