Cable HOP Considerations

97-089R0

This section describes the design criteria which will determine the number of cable hops in a 1394 cable distribution interconnect model. The following are a list of given criteria from which designs are created.

Power pair dc resistance

The dc resistance of the power wires shall be:

$R_V \leq 0.333\ \Omega$

$R_G \leq 0.333\ \Omega$

This resistance number includes the interconnect resistance of the mated pairs (connector and receptacle) at both ends of the cable.

Output current per port

The maximum through any single port shall be 1.5 Amperes.

Voltage drop through the cable

The maximum voltage drop across the cable, including mated connector resistance at both ends, shall be 0.5 V (1.5 A x 0.333 Ω). This implies a maximum cable length of 4.5 meters long with 22 AWG wire. Longer cables may be implemented if the maximum resistance through the cable is maintained. For example, a 12 meter cable, if constructed correctly, could meet the maximum resistance with 18 AWG (19/30) wire.

Device minimum input requirements

A device may consume up to 3 watts of power upon power-up and requires a minimum of 7.5 V.

Port-to-Port IR drop

In certain configurations the port-to-port IR drop can be as high as the PCB trace resistance and two current limiters multiplied by the maximum output current. The maximum port-to-port resistance shall be 0.5 Ω.

Discussion

Given the absolute numbers above, several models can be examined from very basic home or office models to "LAN"-type set-ups. The following are a few of the many methods with which the 1394 cable can be connected. The analysis which follows assumes that no additional power is available to the leaf node (power consumer), i.e. the devices between the Power Provider and the Power Consumer are pass-thru devices.

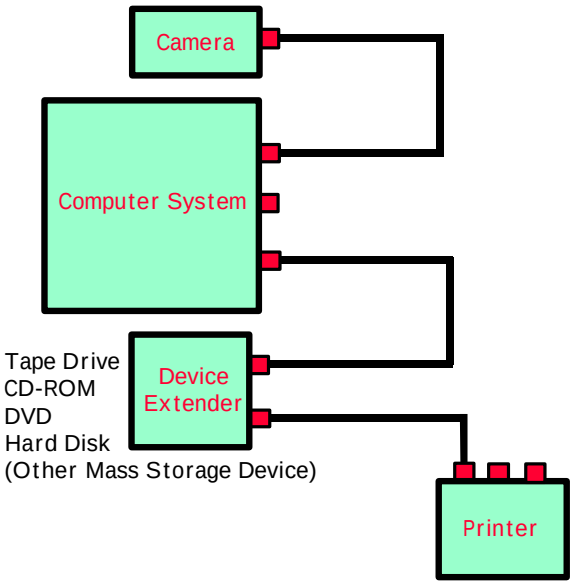

Figure 0-1 -- Typical "PC" 1394 Device & Interconnect

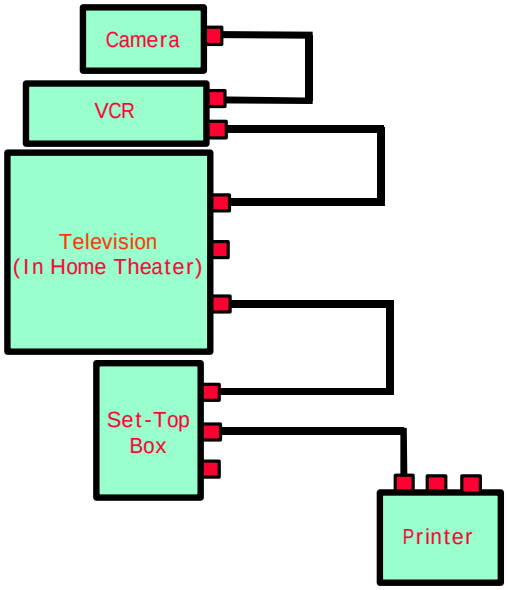

Figure 0-2 -- Typical "CE" 1394 Device & Interconnect

Based upon quantitative analysis using the constants and assumptions given above, the following hop limitations should be considered.

	Power (min.)	Output Current	Cable (meters)	Wire (AWG)	Output Voltage	Output Power	Hops (max.)
PWR_CLASS = 001b	15 W	1.50	4.5	22	20	30	10
		1.50	7.0	20	20	30	10
		1.50	12.0	18	20	30	10
		1.25	4.5	22	20	25	12
		1.25	7.0	20	20	25	12
		1.25	12.0	18	20	25	12
		1.00	4.5	22	20	20	16
		1.00	7.0	20	20	20	16
		1.00	12.0	18	20	20	16
PWR_CLASS = 010b	30 W	1.50	4.5	22	20	30	10
		1.50	7.0	20	20	30	10
		1.50	12.0	18	20	30	10
		1.25	4.5	22	24	30	17
		1.25	7.0	20	24	30	17
		1.25	12.0	18	24	30	17
		1.00	4.5	22	30	30	29
		1.00	7.0	20	30	30	29
		1.00	12.0	18	30	30	29
PWR_CLASS = 011b	45 W	1.50	4.5	22	30	45	19
		1.50	7.0	20	30	45	19
		1.50	12.0	18	30	45	19
		1.25	4.5	22	30	37	23
		1.25	7.0	20	30	37	23
		1.25	12.0	18	30	37	23
		1.00	4.5	22	30	30	29
		1.00	7.0	20	30	30	29
		1.00	12.0	18	30	30	29