

Application Note 120  
28-Jun-2006

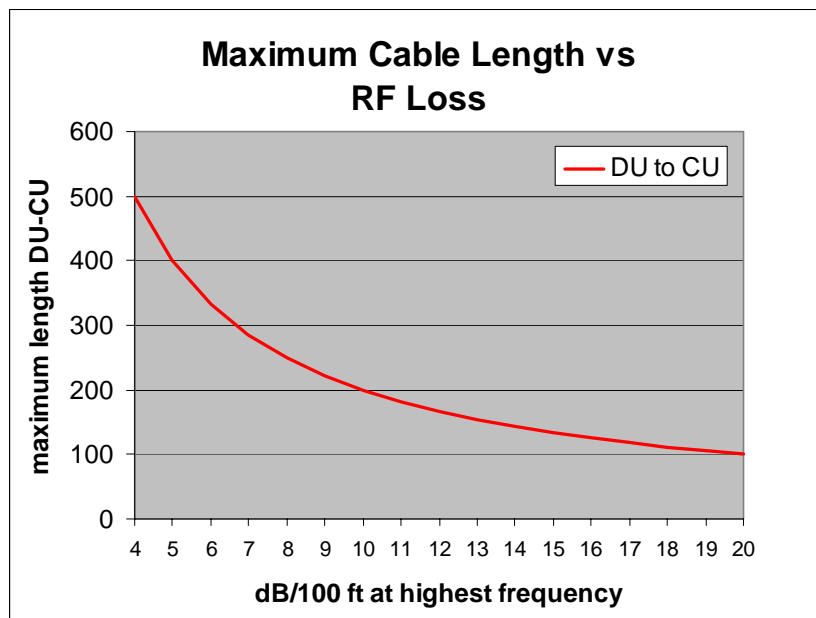
## Alternative cables for the SpotCell 2500Xe

The standard cables that are shipped by Spotwave for the 2500Xe are rated to ensure that when maximum recommended lengths are not exceeded:

- the maximum DC voltage drop from the standard 24V SpotCell 2500Xe power supply to the Donor Unit (DU) is 4 volts
- the RF attenuation is less than 20 dB @ the 1900 MHz band or less than 15 dB @ the 850 MHz band

When non-standard 75 ohm coaxial cable is used to install a 2500Xe system, use the following procedure to ensure that the cable RF attenuation and DC resistance meet system requirements.

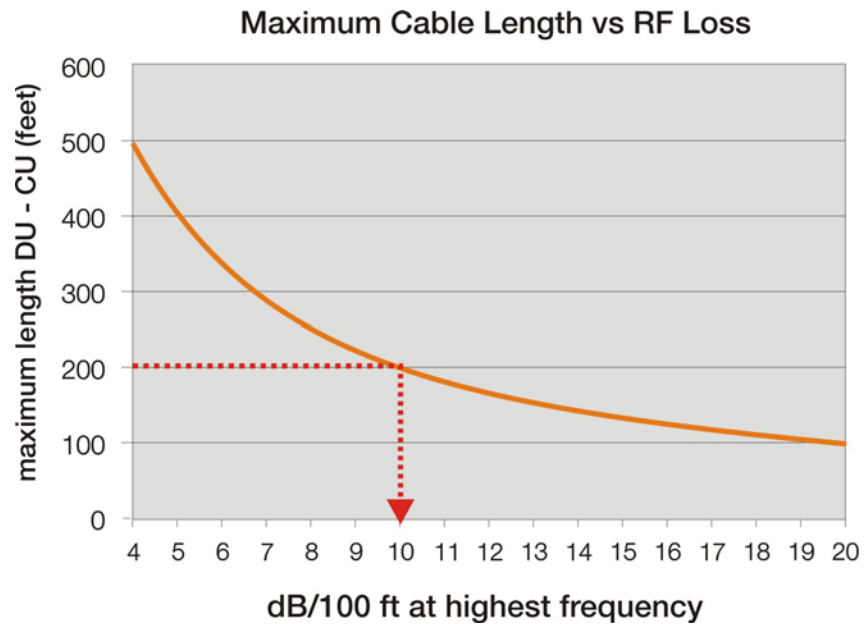
1. Determine the routed cable length required between the Donor Unit and Coverage Unit.
2. Determine the cable RF attenuation (in dB/100 ft) from the cable supplier's data sheet. Use the highest frequency of operation for the system (cell band = 894 MHz, PCS band = 1990 MHz). It may be necessary to round up to the next highest frequency as most cable manufacturers data sheets do not provide information for these specific frequencies.
3. To achieve full coverage, the cable attenuation must be less than 20 dB @ 1900 MHz or less than 15 dB @ 894 MHz. Using Graph 1 below, read off the maximum length supported by the cable. If this is less than the desired cable run, choose a cable with a lower attenuation that equals or exceeds the desired maximum length.



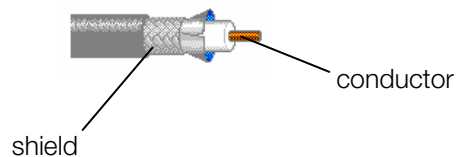
Graph 1: Maximum cable length vs. RF loss

**Example 1**

A cable run of 200 ft is required between the CU and DU for a dual band system with the highest frequency of 2GHz. The graph below shows that for a 200 foot length of cable, the cable attenuation must be less than 10dB/100ft (at 2GHz).



- Once a cable with the correct RF characteristics has been identified, determine the round trip DC resistance of the cable. This is normally specified separately for the conductor (or core) and shield (or outer) parts of the cable, in ohms/1000 ft.



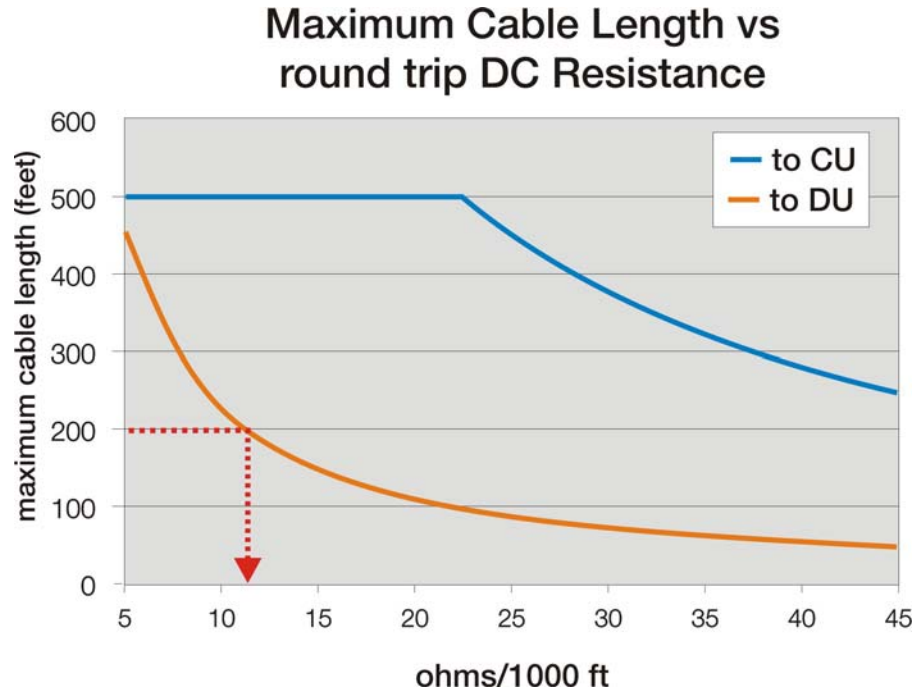
**Figure 1: Coaxial cable**

The round trip resistance is the sum of these core and conductor resistance.

$$\text{Round trip resistance} = \text{conductor resistance} + \text{shield resistance.}$$

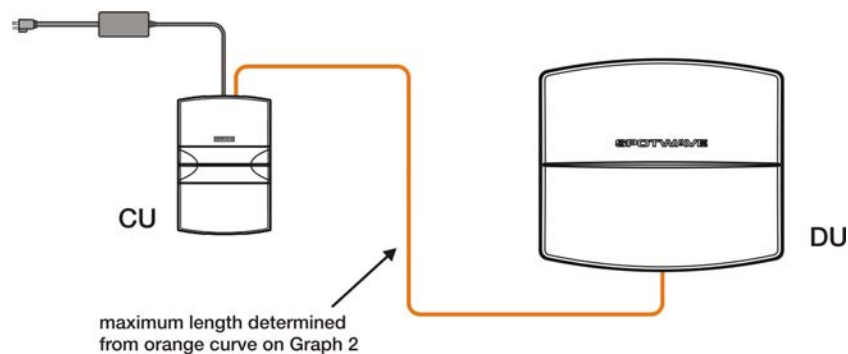
**Note:** Many of the low cost coaxial cables have a centre conductor made of steel which has a much higher resistance than the shield.

- Look up the round trip resistance value on the Graph 2 below, and read off the maximum distance on the DU (orange) curve.



**Graph 2: Maximum cable length vs. round trip DC resistance**

Graph 2 shows the maximum distance from the DU that power can be inserted into the cable, either directly from the CU or using the power inserter available in the SpotCell 2500Xe Hidden Cable Kit (part #100-10100-01).

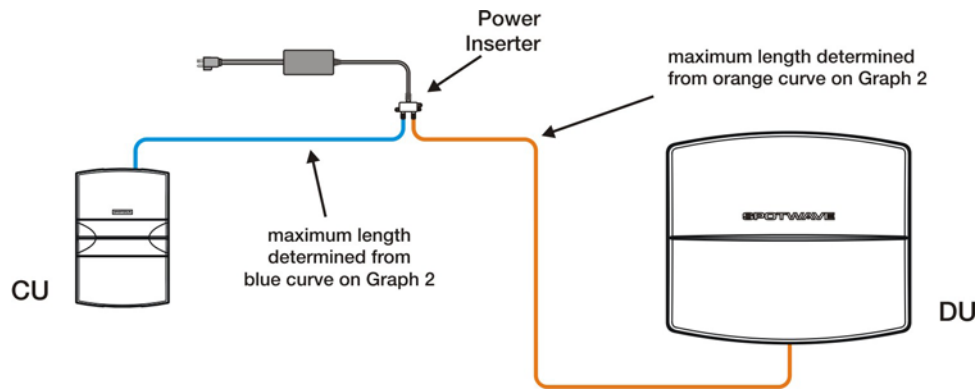


**Figure 2: Standard SpotCell 2500Xe configuration**

**Example 2**

A cable run of 200 ft is required between the CU and DU. The orange curve on Graph 2 shows the round trip DC resistance must be less than 12 ohms/1000 ft in order to properly power the system from the CU.

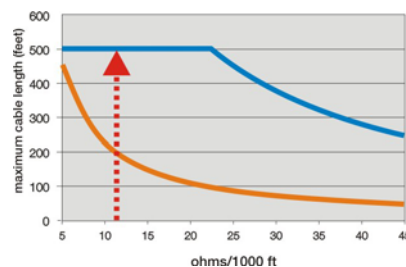
- If the system is powered via a power inserter, the maximum length to the CU must also be checked. This is shown on the blue plot in Graph 2. The CU current draw is roughly 1/4 that of the DU, allowing a longer cable length.



**Figure 3: SpotCell 2500Xe with power inserter**

**Example 3**

The same cable from Example 2 (round trip resistance of 12Ω/1000 ft) is to be used in a SpotCell 2500Xe system that uses a power inserter (as shown above in Figure 3).



The blue curve shows that the length of cable that can be used to connect the CU to the power inserter is 500 ft (the maximum cable length due to RF loss).

## Appendix – 2500Xe Cable

### SpotCell 2500Xe Cable Specifications

Characteristic Impedance: 75 ohm

Cable assembly Return Loss: > 20 dB for a 1.0 Vrms signal swept from 800-2000 MHz into a 75 Ohm load.

### Cables that meet the requirements of the SpotCell 2500Xe

Cable Type	Manuf/ Model	Round trip dcr (Ohm/1000 ft)	I.L. at 850 MHz (dB/100 ft)	I.L. at 1990 MHz (dB/100 ft)	Notes Copper Core (CC), Steel Core (SC), Quad Shield (QS), Dual Shield (DS)
RG-6	<i>Belden</i>				
	5339Q5	13.5	7	11.3	CC, QS
	5339G5	43	6.5	8.8	SC, QS
	7915A	11	6	8.6	CC, DS
	7916A	11	6	8.6	CC, DS
	1189A	32.8	6.5	N/A	SC, DS
	<i>Coleman</i>				
	920414	12.6	7	11.1	CC, QS
	92003	39.2	6.6	11.1	SC, DS
	RG-6 Plenum	<i>Belden</i>			
6339Q8		8.9	8.5	14.6	CC, QS
1189AP		32.8	8.2	N/A	SC, DS
RG-11	<i>Belden</i>				
	7731A	4	4.3	6.4	CC, DS
	1523A	15.1	4.2	N/A	SC, DS
RG-11 Plenum	<i>Belden</i>				
	7732A	4.1	5.5	8.1	CC, DS
	1523AN	15.1	4.2	N/A	SC, DS