Communication Protocols for Power Supplies

Protocol	Max Connections/ Nodes	Max Rate (Kbps)	Max Bus Length (ft)	Comments
UART	2	250	50	Full-duplex, 2 wire Usually slower than SPI or I2C Only 2 devices
RS232	2	921	50	Similar to UART, but higher noise immunity Only 2 devices
Extended UART	2	250	50	Half-duplex Similar to UART, wih added functionality Used in Cosel PCA Series power supplies
I2C	128	5,000	12	Multi-master More reliable than UART Slower than SPI More complex hardware than SPI
SPI	128 (only 1 master)	10,000	10	Full-duplex, 3 or 4 wire Only 1 master More reliable than UART Best for high-speed data to memory
PMBus	100	400	3	Full-duplex, 2 wire For power converter management
SMBus	127	100	6	Full-duplex, 2 wire Based on I2C Low-speed communication Best for smart battery management
CAN Bus	127	10,000	1,600	Half-duplex, 2 wire Best for automotive or heavy equipment Supports more complex networks than RS485
RS422	1 transmitter 10 receivers	10,000	4,000 at lower speed	Full-duplex, 4 wire High noise immunity Best for industrial and factory applications
RS485	32 master & slaves up to 256 repeaters	10,000	4,000 at lower speed	Full-duplex, 2 wire with ground High data rates High power consumption Best for industrial machinery