SPMD additional use cases Transportation

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Usecase: Train/Tram- Seatreservation

Item	Min Value	Desired value	Extra information
Supported nodes on one mixing segment	30	40	18 rows within 1 waggon
Minimum supported cable length		40	
Acceptable cable gauges	AWG24		
Required power for a node			
Required initial power allocation		?	
60V voltage OK ?	Yes		24V preferred
Interoperability level for the application	Engineered		
Pass through or T connection	T-Connection		
Hotpluggability	Not applicable		
Possible market (in #nodes/year)			
TSN/PTP	Not required		

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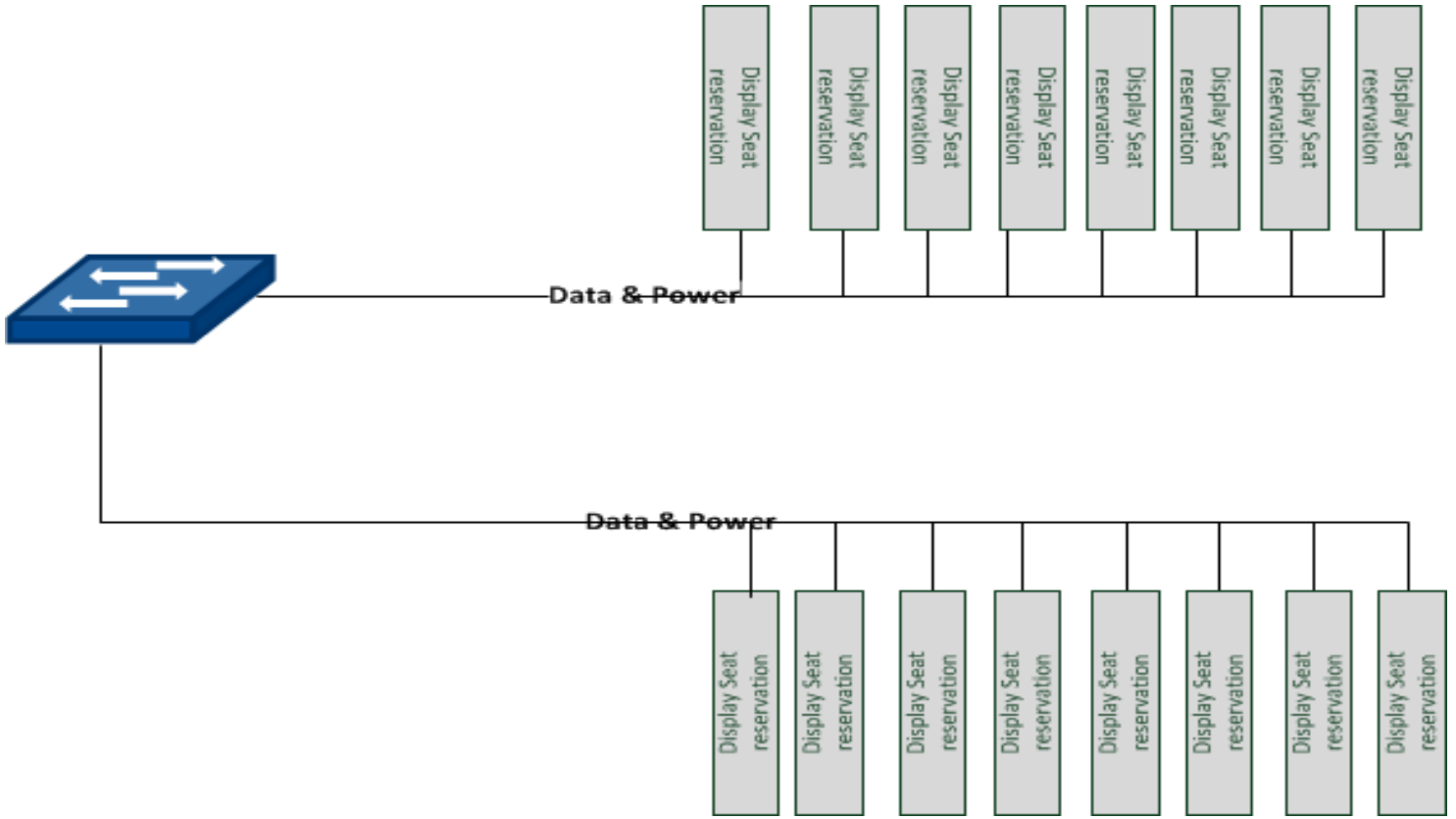
Usecase: Train/Tram- Seatreservation



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Usecase: Train/Tram/Bus

Item	Min Value	Desired value	Extra information
Supported nodes on one mixing segment		6	Passanger Counter, Stop Signal, Ticket automat, Door opener, SOS Terminal
Minimum supported cable length		25	
Acceptable cable gauges	AWG24/22		
Required power for a node	1W	30W	In summary 40-50W for the multidrop line
Required initial power allocation		2W	
60V voltage OK ?	24V		
Interoperability level for the application	Engineered		
Pass through or T connection	T-Connection		
Hotpluggability	No		
Possible market (in #nodes/year)	260 000 multidrop lines /year		IHS for 2020 with annual growth of 9%
TSN/PTP	Yes		

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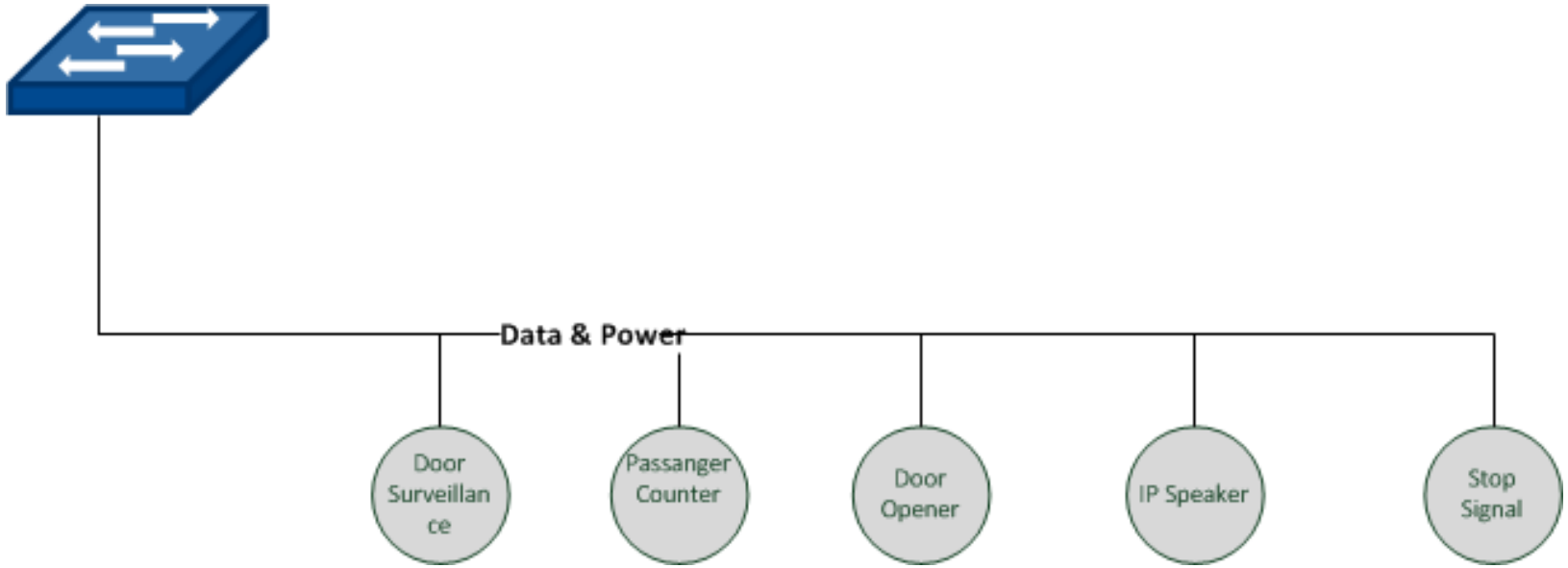
Usecase: Train/Tram- Door



Shielded cables are currently in use, also for RS485 based communication.

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Usecase: Train/Tram/Bus EMI requirements

	E3 (IEC 29106) acc. to the MICE table	Train / Tram : EN 50155:2017 (EN50121-3-2)	Bus/ Tram: ECE-Regulation No.10, Rev.5
ESD	Contact discharge: +/-4kV Air discharge: +/- 8kV Acc. to IEC 61000-6-1 /-2	Contact discharge: +/-6kV Air discharge: +/- 8kV Acc. to EN50121-3-2	No requirements
Radiated RF	10 V/m at 80 MHz to 1 000 MHz 3 V/m at 1 400 MHz to 2 000 MHz 1 V/m at 2 000 MHz to 2 700 MHz Acc. to IEC 61000-6-2	20 V/m at 80 MHz to 1000 MHz 10 V/m at 1.4 GHz to 2.0 GHz 5 V/m at 2.0 GHz to 2.7 GHz 3 V/m at 5.1 GHz to 6.0 GHz Perfermance criteria: max. packet loss within def. BER Acc. to EN50121-3-2	30 V/m (AM max. level) at 20MHz to 800 MHz* Modulation: 1 kHz, 80% AM The continuous-wave level is 16,7 V/m 30V/m * at 800 MHz to 2.0 GHz* Modulation: Pulse modulation 577 µs, period: 4600 µs *over 90% of the frequency range. 25V/m over 100% of the frequency Range Perfermance criteria: max. packet loss within def. BER
Conducted RF	10 V at 150 kHz to 80 MHz Acc. to IEC 61000-6-2	10V at 150 kHz to 80MHz Perfermance criteria: max.packet loss within def. BER Acc. to EN50121-3-2	No requirements defined
Burst	1000 V Acc. to IEC 61000-6-2	2000 V Acc. to EN50121-3-2	
Surge		No requirements on data lines	No requirements defined

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Thank You