WoMaster

Industrial 1-port Fast Ethernet PoE to Fiber Media Converter

DP101

New Product Launch

Agenda

- Product Appearance
- Product Features
- Product Advantages
- Product Comparison
- Key Selling Point

Product Appearance

System LED
- 1x Power
- 1x Mode
- 1x LLF
- 2x FX
  - 1x LNK
  - 1x FDX
- 1x PoE

1-port 100Base-FX (SC/ST model)

DIP Switch
- 1x Forwarding Mode
- 1x RJ45 mode
- 1x LLF
- 1x PoE On/Off
- 2x PoE Budget

DIN Clip

1-port 10/100Base-TX

Power Connector
- 1 x 3 pin terminal block
  - 3 pin for power input

Grounding Screw

Product Features

- True Ethernet Media Converter
  - Converts Optical Signal and Ethernet Electrical Signal
  - IEEE 802.3u 100Base-FX, 100Mbps Fast Ethernet Optical Fiber
  - IEEE 802.3 10Base-T Ethernet
  - IEEE 802.3u 100Base-TX ,100Mbps Fast Ethernet

- Dual Forwarding Modes
  - Pure Media Converter, Switch- Store and Forward
  - Pure Converter Mode
    - Low Packet Forwarding Latency – $1.6x10^{-6}$ Sec(1.6us)
  - Switch- Store and Forward Mode
    - TX 10/100Mbps Auto-Negotiation and Auto MDI/MDI-X
    - IEEE 802.3x Flow-Control & Back-Pressure
    - Error Packet Filtering

Product Features

- Friendly DIP-Switch configuration
  - Forwarding Mode
    - Converter / Store & Forward
  - RJ45 Link Mode Change
    - 100Mbps Full Duplex / Auto-Negotiation
  - Link Loss Forwarding— Enable / Disable
  - PoE Function enable/Disable
  - Forced power supply— PoE Power Budget

- Link Loss Forwarding(LLP)
  - Bi-Directional Link Loss Forwarding
  - Bi-Directional Auto Recovery

Product Features

- Smart PoE Capability
  - Fully Compatible with IEEE 802.3 Detection and Classification
  - Unmanaged PoE injector /Fiber Converter , High Power 90W.
  - Auto PD Type Recognize- Standard or Non-Standard
  - Auto PD detection – Powering , Auto Forced Mode Powering , 2 behaviors auto
  - Built-in Over-Current, Cable Short Protections for Non-Standard PD

- Hardened System Design
  - IP40 protection to withstand harsh environment
  - Extreme Operating Temp. -40 ~ 75°C
  - Redundant Power Input

- Standard Compliance
  - IEC 61000-6-2/ IEC 61000-6-4 Heavy Industrial EMC
  - EN50121-4 Railway Track Side EMC

Product Advantages

- Compact Size Design
  - Cigarette Unit Box Size, Saving Install Space
  - Easy Cable Reorganize
- Dual forwarding mode
  - Choice suitable mode for application
  - Extreme Low Packet Forwarding Latency
- Link Loss Forwarding
  - Real Time Far-End Link Fault Alert
  - Ethernet Optical Fiber and Ethernet RJ-45 Communication

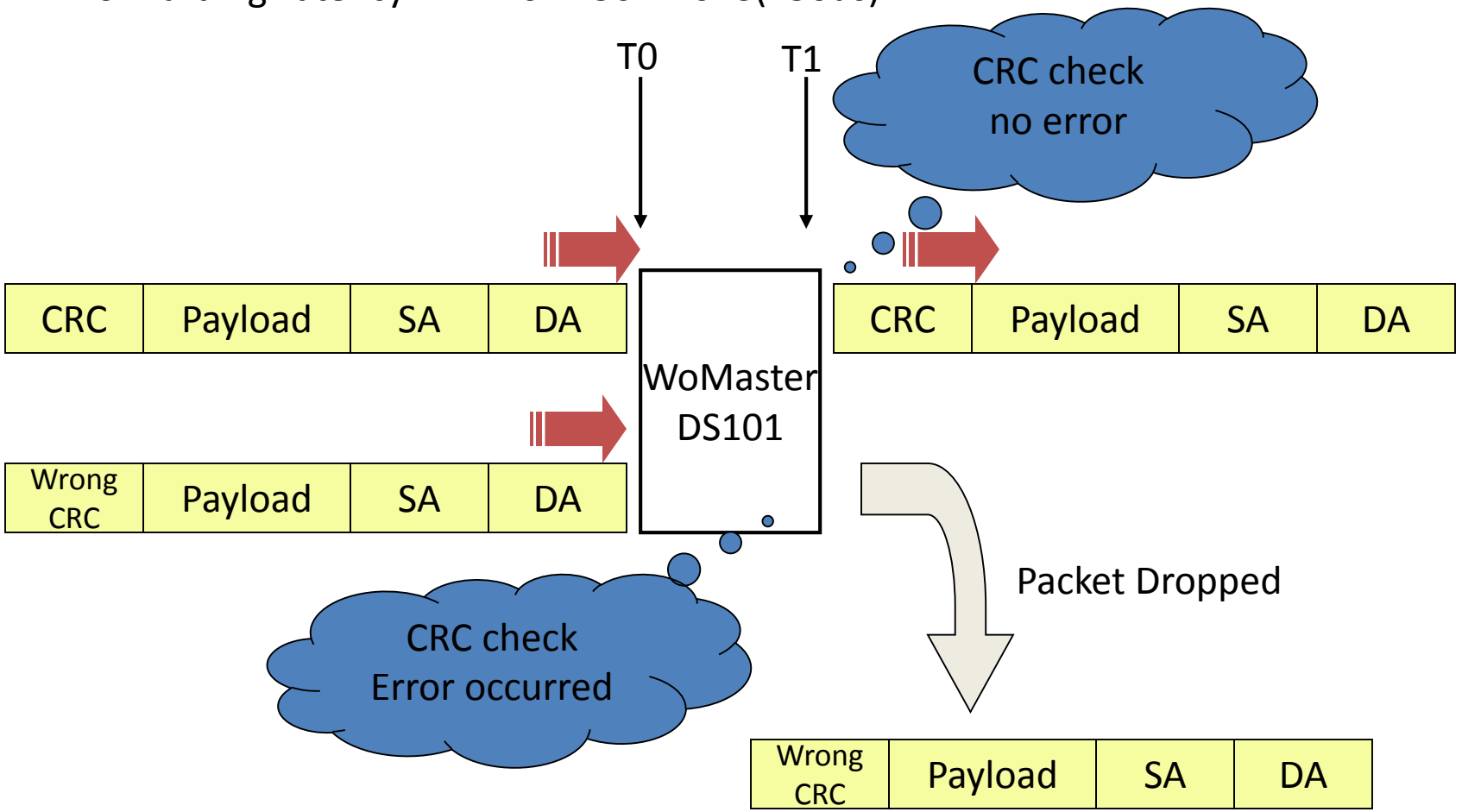
Product Advantages

- Hardened System Design
  - Survive Under -40 ~75°C Environment
  - Redundant Power Input
  - Ingress Protection – IP40
  - Superior Anti Electrical Interference
  - Suitable for Telecommunication Negative Power System
- Various Fiber Connection
  - Duplex SC /ST Type, Multi-mode, Single-mode
  - WDM model will be provided per request
- Special Vertical Market Application
  - Factory Automation – Real Time Machine Communication
  - Railway Track Side – PLC Communication
  - Telecom Unattended Station – Ethernet / Fiber Convert

Dual Forwarding Mode

- Store & Forward Mode

Forwarding Latency = T1-T0 =250 x 10^{-6}S(250us)



Dual Forwarding Mode

- Store & Forward Mode Test Report

Store and forward

CT: Cut Through (or FIFO), S&F: Store & Forward (or LIFO))

Latency Test

Test duration (sec):100 | Number of pairs:1

Minimum frame size (byte):64 | Initial rate (%):100.00

Maximum frame size (byte):1518 | Step rate (%):10.00

Step frame size (byte):Custom | Resolution rate (%):None

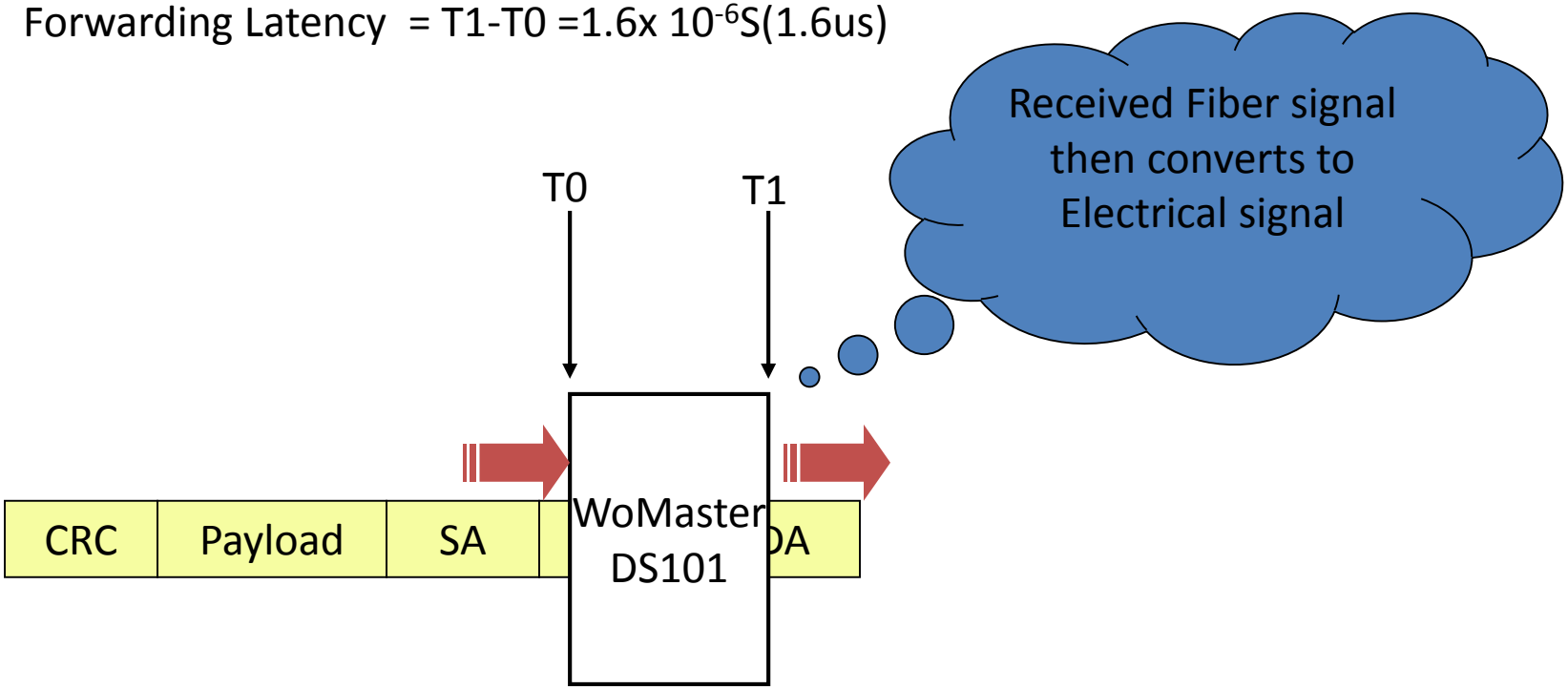
**Measured on one receiving card only | Mode: Uni-directional

Frame Size	Rate Tested(%)	(01,02,01) to (01,03,01) (us)-CT	Average (CT)	(01,02,01) to (01,03,01) (us)-S&F	Average (S&F)
		100M -100M		100M -100M	
64	100.00	15.6	15.6	10.4	10.4
128	100.00	26.0	26.0	15.7	15.7
256	100.00	46.4	46.4	25.9	25.9
512	100.00	87.4	87.4	46.4	46.4
1024	100.00	168.7	168.7	86.7	86.7
1280	100.00	210.1	210.1	107.7	107.7
1518	100.00	248.2	248.2	126.8	126.8

Dual Forwarding Mode

- Pure Converter Mode

Forwarding Latency = T1-T0 =1.6x 10^{-6}S(1.6us)



Extreme Low Packet Forwarding Latency

Dual Forwarding Mode

- Pure Converter Mode Test Report

Converter mode

CT: Cut Through (or FIFO), S&F: Store & Forward (or LIFO))

Latency Test

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Minimum frame size (byte):64 Initial rate (%):100.00

Maximum frame size (byte):1518 Step rate (%):10.00

Step frame size (byte):Custom Resolution rate (%):None

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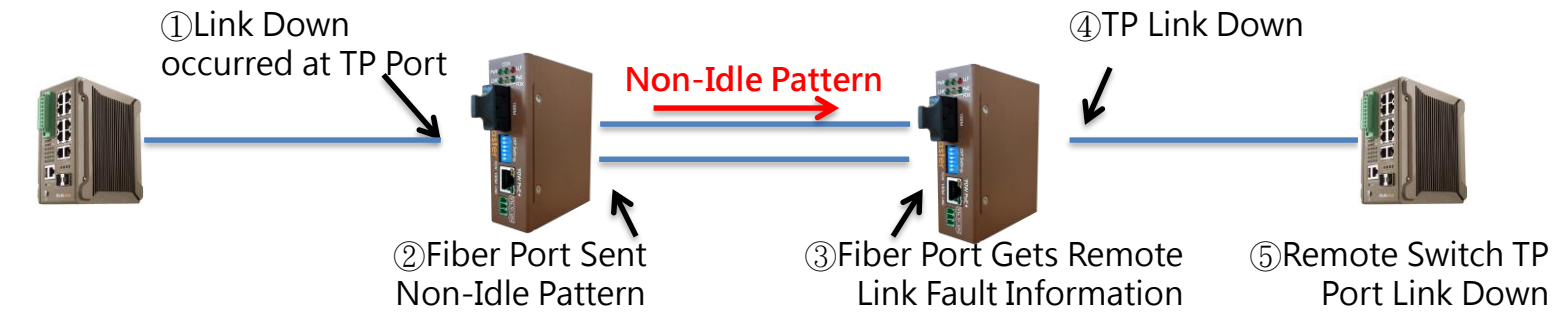
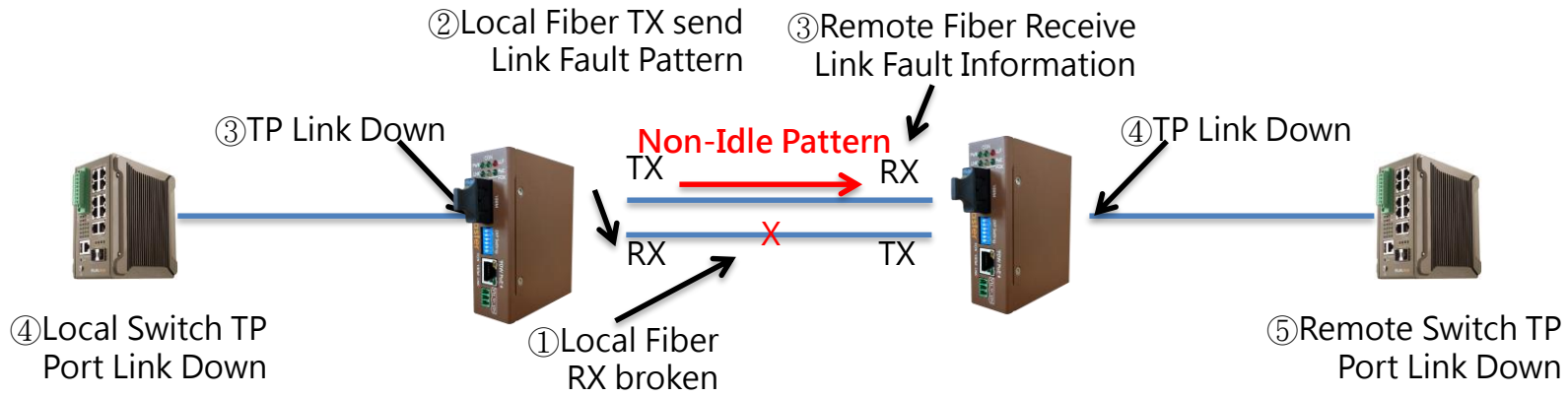
Frame Size	Rate Tested(%)	(01,02,01) to (01,03,01) (us)-CT	Average (CT)	(01,02,01) to (01,03,01) (us)-S&F	Average (S&F)
		100M -100M		100M -100M	
64	100.00	1.6	1.6	0.0	0.0
128	100.00	1.6	1.6	0.0	0.0
256	100.00	1.6	1.6	0.0	0.0
512	100.00	1.6	1.6	0.0	0.0
1024	100.00	1.6	1.6	0.0	0.0
1280	100.00	1.6	1.6	0.0	0.0
1518	100.00	1.6	1.6	0.0	0.0

Link Loss Forwarding

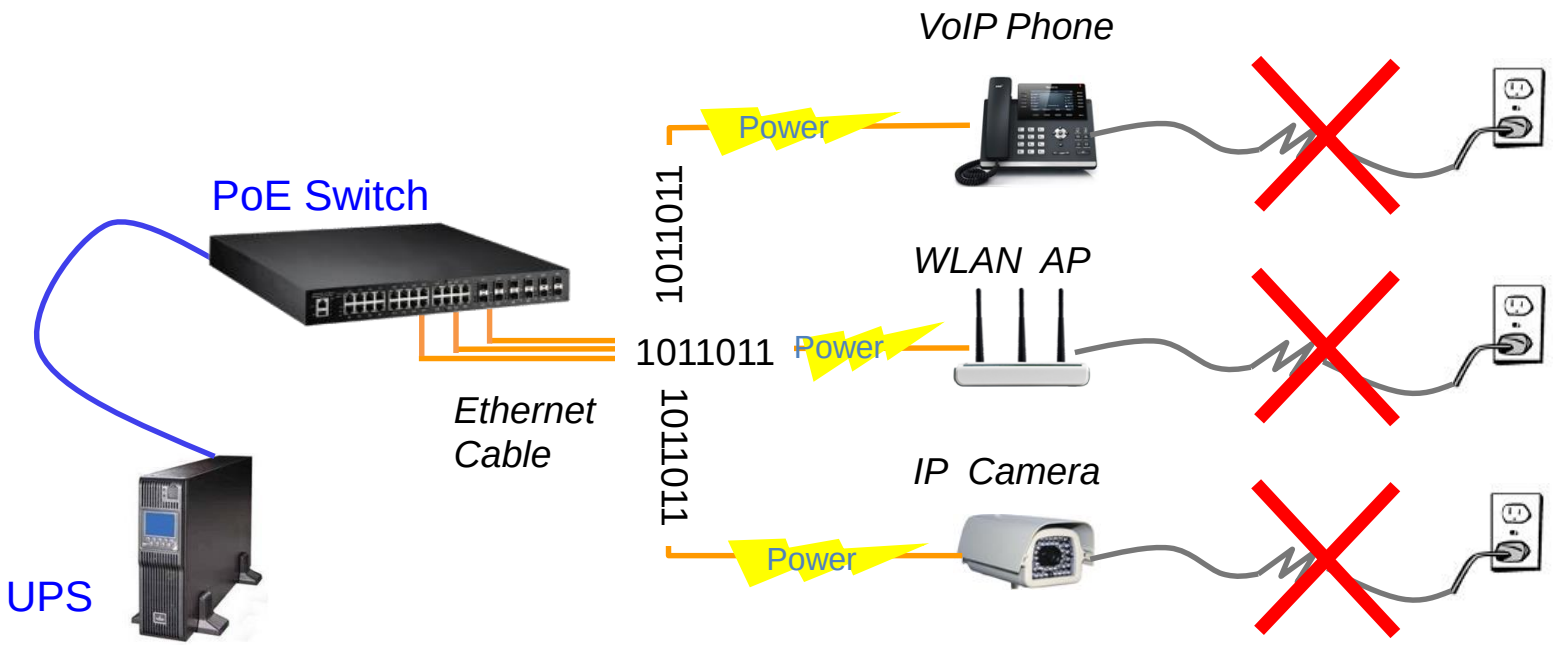
- Real time alert for management





Smart PoE Capability

- PoE（ Power Over Ethernet ）
  - Simultaneous transmission of data / power



Smart PoE Capability

- IEEE802.3af/at/bt Comparison

Type	Type 1	Type 2	Type 3	Type 4
Standard	802.3af	802.3at	802.3bt	802.3bt
PSE Output Power	15.4W	30W	60W	90W
PD Input Power	12.95W	25.5W	51~60W	71~90W
Power Over	2 pairs	2 pairs	Class 0-4:2/4 pairs Class 5/6:4 pairs	4 pairs
Cable length	100m	100m	100m	100m
Application	IP Camera	HD camera	IP Dome Cameras, PoS and Digital signage	

Smart PoE Capability

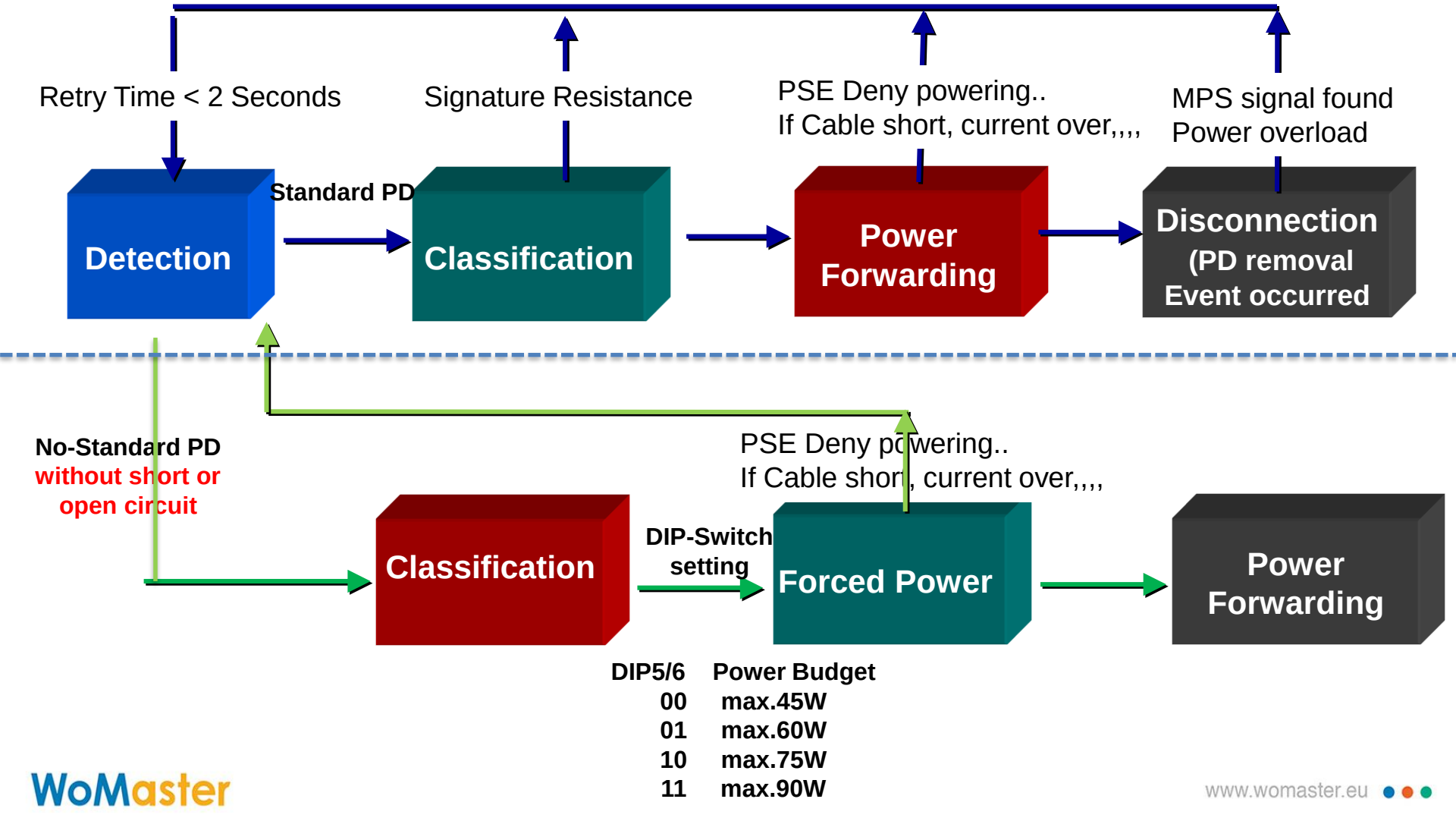
- 90W PoE++
  - Sub-zero temperature video surveillance in alpine regions
    - Lens rotation
    - Heating system

Ultra PoE Camera (Heater inside)

- Digital signage
- Public space information inquiry system

Smart PoE Capability

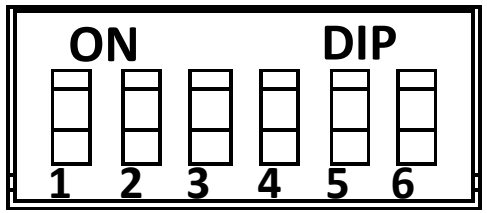
- PoE flow chart



DIP5/6	Power Budget
00	max.45W
01	max.60W
10	max.75W
11	max.90W

Friendly DIP-Switch Configuration

- DIP-Switch select



DIP NO.	ON	OFF（Default）
1	Set to Converter Mode	Set to Store and Forwarding Mode
2	Set RJ45 in 100Mbps Full Duplex Mode	Set RJ45 in 100Mbps Auto Negotiation Mode
3	Enable Link Loss Forwarding function	Disable Link Loss Forwarding function
4	PoE Enable	PoE Disable

DIP5	DIP6	Power Budget For No-standard PD	Power Budget For Standard PD
OFF	OFF	Class 5: 45W	Auto Mode Class 0~Class 8 Max：90W
OFF	ON	Class 6: 60W	
ON	OFF	Class 7: 75W	
ON	ON	Class 8: 90W	

***Note: When DIP4 is turned on and the PD is a non-standard device, the DIP5 DIP6 setting forced power supply is valid!**

Hardened System Design

- Superior Anti Electrical Interference

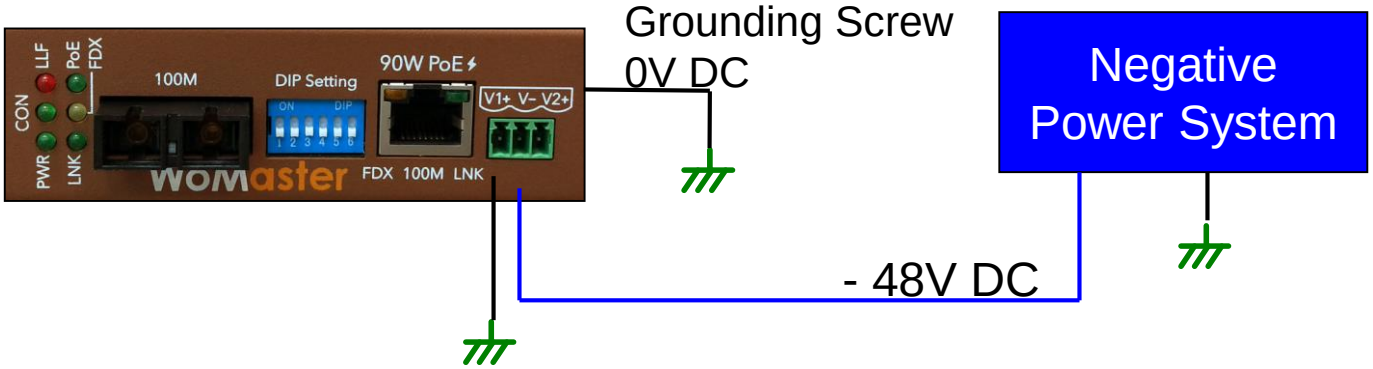
Test Item	EN 61000-6-2 Standard *(Heavy Industrial Environment)*	EN 50121-4 Standard *(Railway Trackside)*	Testing Level	Result
EN 61000-4-2 ESD	Contact 4kV, Air 8kV **Criteria B**	Contact 6kV, Air 8kV **Criteria B**	Contact 6kV, Air 8kV	**A**
EN 61000-4-4 EFT	DC: ±2kV, 5kHz **Criteria B**	DC: ±2kV, 5kHz **Criteria A**	DC: ±2kV, 5kHz	**A**
	Signal Port: ±2 kV, 5kHz **Criteria B**	Signal Port: ±2 kV, 5kHz **Criteria A**	Signal Port: ±2 kV, 5kHz	**A**
		Earth port: ±1 kV, 5kHz **Criteria A**	Earth port: ±1 kV, 5kHz	**A**
EN 61000-4-5 Surge (1.2/50us)	Signal Port: Common ±2KV **Criteria B**	Signal Port: Differential ±1kV, Common ±2kV **Criteria B**	Signal Port: Common ±2Kv, Differential ±1kV(only for non-RJ45)	**A**

Hardened System Design

- Suitable for Telecom Negative Power System
  - Safety voltage(-48VDC)
    - Human body safety current:max: 9mA
    - 48/50000 = 0.00096A = 0.96 mA
  - Reduce system noise and reduce interference

Hardened System Design

- Positive / Negative Power system
  - Cable negative Protection cable is not corroded



Input Voltage: 0-(-48V)=48V

Various Fiber Connection

- Type
  - Meet different transmission distance requirements
  - SC /ST Type、Single-Mode/Multi-Mode
  - DP101-M-SC/ST-2 & DP101-S-SC/ST-30
  - ***WDM- A TX 1310nm,RX1550nm/WDM-A TX 1550nm, RX 1310nm***

- Efficacy

	Distance	FP Laser Wavelength	TX Range	RX Range	Link budget
Single-Mode	30KM	1310 (1260~1360)	-8~-3dBm	-32~-3dBm	24dB
Multi-Mode	2KM	1310 (1260~1360)	-20~-12dBm	-30~-3dBm	10dB

Power Budget = min(Launch Power) - max(Receive Sensitivity)

Various Fiber Connection

- The maximum fiber distance estimate
  - Example using 30 km run of 1310 SM fiber

Fiber Loss Table

Wavelength/Mode	Fiber Core Diameter	Attenuation per Kilometer*	Attenuation per Splice	Attenuation Per Connector	Modal Bandwidth (MHz-km)
850 nm multi-mode	50 µm	2.40 dB	0.1 dB	0.5 dB	500
850 nm multi-mode	62.5/125 µm	3.00 dB	0.1 dB	0.5 dB	200
1300 nm multi-mode	50 µm	0.70 dB	0.1 dB	0.5 dB	500
1300 nm multi-mode	62.5/125 µm	0.75 dB	0.1 dB	0.5 dB	500
1310 nm single-mode	9 µm	0.35 dB	0.01 dB	0.5 dB	N/A
1550 nm single-mode	9 µm	0.22 dB	0.01 dB	0.5 dB	N/A

Various Fiber Connection

- The maximum fiber distance estimate

Loss = (Fiber Attenuation x km)
+ (Splice Attenuation x # of splices)
+ (Connector Attenuation x # of connectors)
+ (Safety Margin)
= Total Loss

Loss = (0.35 dB x 30) = 10.50 dB
+ (0.01 dB/splice x 15) = 0.15 dB
+ (0.5 dB/connector x 2) = 1.00 dB
+ (3 dB Safety) = 3.00 dB
= 14.65 dB total loss

14.65 dB < 24 dB

Key Selling Point

- Compact Size Design
- Smart PoE Capability
  - Fully Compatible with IEEE 802.3 Detection and Classification
  - Up to 90W power budget
  - Auto PD Type Recognize- Standard or Non-Standard
- Dual Forwarding Modes
  - Pure Converter / Store & Forward Mode
- Bi-directional Link Loss Forwarding
- Friendly DIP-Switch configuration
  - Forwarding Mode、TX 100Mbps Half、LLP、PoE Setting
- IEEE 802.3af/at/bt compliant PoE, Up to 90W power budget
- Extreme Low Packet Forwarding Latency – $1.6x10^{-6}$ Sec
- IP40 ingress protection to withstand harsh environment
- Extreme Operating Temp. -40 ~ 75°C
- EN50121-4 railway trackside EMC
- IEC61000-6-2/IEC61000-6-4 heavy industrial EMC

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Master In IIoT World