ADVICE
Creative Technology Solutions

Advantage Series
EN2.0 PDU

נאור לוי
מנהל תחום תקשורת ו-EV Charger
אדוויס אלקטרוניקה בע"מ

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Advantage Series

nVent– Core Products

Rack and Cabinets

Server Cabinets

Other Cabinets
Indoor and Outdoor
IP, EMC protected

Cable Management

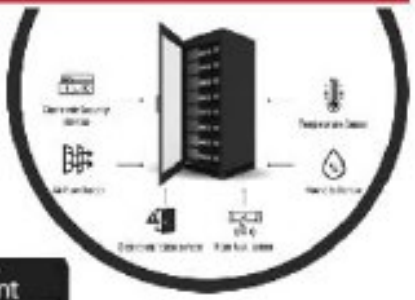
Cooling

ROOM BASED COOLING

DENSITY

CPU BASED COOLING

Power Distribution, Environment Monitoring and Access Control



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nVent– Serving Customers with local capabilities

EMEA

nVent has locations in 18 countries and more than 40 cities across Europe, and a strong presence in the Middle East.

North America

nVent has 21 locations in the U.S., seven in Canada and three in Mexico

APAC

nVent has a strong foundation for growth, with manufacturing, warehouse and office locations throughout APAC

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Customization Capabilities

Build-to-Order

100's Standard Models

- Most common pre-configured designs , built on demand
- 2- week production lead-time

Configure-to-Order

1,000's Semi-Custom Models

- Quick-turn custom configured versions of BTO
- Pre-configured part numbering, charted drawings, and contract pricing for on-demand, zero-touch order processing
- Options for custom plug, cord, orientation, chassis color
- 2-3 week production lead-time

Engineered-to-Order

Unlimited Configuration Options

- Utilize library of common sub-assemblies & family compliance for quick ETO turn-around
- Full customization capabilities form factor, outlet counts , colors, circuit breakers, etc
- 3-5day turn for quote , drawing, and specification
- week production lead time for many ETO orders
- ETO SKUs transition to BTO after first order

CTO Example

EN1403

Input Metered, 400V 3ph, 16A

Standard BTO Part Number

EN	1	4	03

Product Series
EB = Basic PDU
ES = Edge Series
EN = Advantage Series
EZ = Inline Meter

Product Series
0 = Basic PDU
1 = Input Metered
2 = Switched
5 = Outlet Metered
6 = Outlet Metered, Switched

Input Rating
3 = 1ph
4 = 3ph, ≤20A
8 = 3ph, >20A, ≤32A
9 = 3ph, >32A

Serialized Number
00, 01, 02, … , 99

Pre-Configured CTO Options

v	w	x	y	zz

Alternative Input Plug (~ 50 options)
A = C20 Inlet
B = NEMA 5-15P
C = NEMA 5-20P
.
.
.
N = IEC60309, 516P9W
P = IEC60309, 520P6
Q = IEC60309, 520P6W

Product Series
0 = Black (default)
B = Blue
R = Red
W = White
G = Green
Y = Yellow
9 = special option

Input Cord Length
0 = 3m (default)
1 = 1m
2 = 2m
4 = 4m
5 = 5m
6 = 6m
7 = hardwire
A = 0.5m
B = 1.5m
C = 2.5m
D = 3.5m
E = 4.5m
F = 1.8m
G = 1.2m

Orientation
0 =Top (default)
1 = Top front
2 = Bottom
3 = Bottom front
4 = Top, LSZH
5 = Top Front, LSZH
6 = Bottom LSZH
7 = Bottom Front LSZH

Special Feature (>15 options)
01 = 10kAIC (if not default)
02 = 5kAIC (if not default)
D1 = Worldwide rated
.
.
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PDU Portfolio Range

Basic & Intelligent Rack PDUs

InLine Energy Meters

Locking Power Cables

Environmental Sensors & Rack Access

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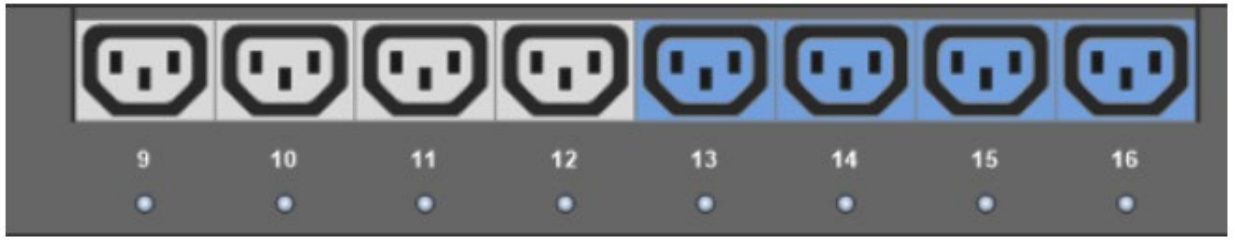
PDU Metering & control- Product Categories

	BASIC PDU	EN1XXX INPUT METERED & INLINE METER	EN2XXX METERED, OUTLET SWITCHED	EN5XXX OUTLET METERED	EN6XXX OUTLET METERED, SWITCHED
1 Safe, Efficient Power Distribution • Premium construction for low power loss • High quality, high temperature components • Locking outlets and color coded circuits	✓	✓	✓	✓	✓
2 Power Metering & Monitoring • Monitor & alarm overload points in real time • Billing grade measurement accuracy • Log and report V, A, pf, VA, W, kWh		✓	✓	✓	✓
3 Outlet Level ON/OFF Switching • Remote ON/OFF control by outlet • User defined power ON/OFF sequence • Outlet level user security access controls			✓		✓
4 Outlet Level Metering • Outlet level energy reporting, kWh • User-defined alarm thresholds • Outlet level power measurements				✓	✓

Outlet Modules & Configurations

**EN1.0 Series-
witched 8 Outlet Block**



**EN2.0 Series-
witched 8 Outlet Block**

EN2.0 Portfolio

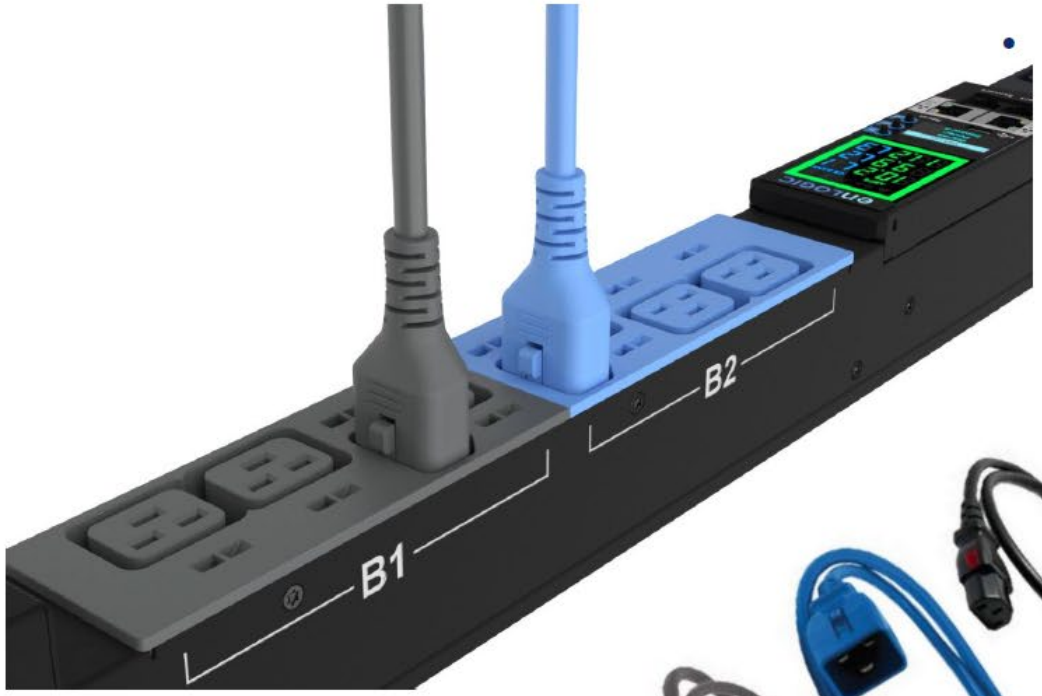
Standard portfolio (2 2-3wk production lead lead-time)

- **46 Vertical PDU SKU's (16A, 32A)**
- **6 ILM's (Inline Energy Meters 16A, 32A, 63A)**
- **Engineer to Order portfolio (5 5-6wk production lead lead-time)**
- **ConfigureConfigure-to -Order, 1200+ quick configurations (based on the many SKU's made for OEM and Enlogic customers)**

EN2.0 Outlet Series

- **Higher Density**
- **Better Outlet Configuration**
- **All PDU's will fit 42U racks**

Locking Outlets & Cords



- **Enlogic Locking Cords**
  - Fit both 1.0 & 2.0 Models
  - Standard colours
  - Black, Blue & Grey
  - Other colours & lengths available
  - Standard Lengths
  - 0.6m / 1.2m / 1.8m

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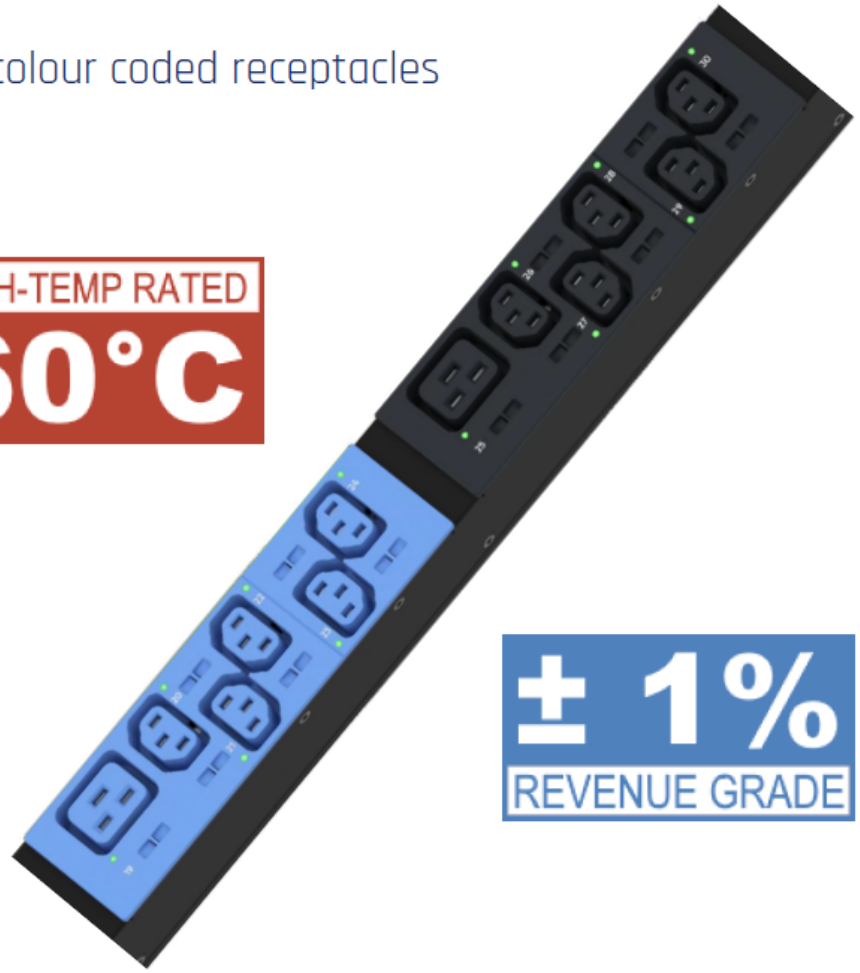
Color Coded Circuit Breakers & Receptacles

Easily identify critical outlet wiring combinations with colour coded receptacles and magnetic circuit breakers

HIGH-TEMP RATED
60°C



Outlet level Comprehensive Measurements:
Voltage, Current, Wattage, kW, kWh (energy), power factor

Designed for
High Temperature
Safe, Reliable Operation
at Full Load Rating

± 1%
REVENUE GRADE

Color Chassis Options

* Other RAL colours available on request

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Environmental Sensor Support

Integrated rack management features eliminates need for secondary systems

Plug & play style digital sensors are factory calibrated with self-identifying electronics design. Digital style allows shortening or lengthening of input cord length using standard ethernet cable and included coupler.

Analog-to-digital chip allows customisable length with no signal degradation

Up to 8 sensors per PDU

- Temperature
- Temperature + Humidity
- 3x Temp + Humidity
- Rope leak
- Spot leak
- Door open/close sensor
- Airflow velocity
- HID/Proximity Security Access Handle

Sensors are compatible with EN1.0 & 2.0 PDU's

For consistency and ease of operation

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Electronic HID Security Access

RFID Series

- *Single ethernet cable connection to PDU for power & data*
- *Combo Antenna (HID, EM & MIFARE)*
- *200 locally stored credentials*
- *500 local events logged*
- *Remote firmware upgrades*

PDU Beacon Light (Programmable for Power, Location, or Environmental Alarms)

Integrated Humidity Sensor

External Sensor Connection

Configurable/Lock Status LED

User Replaceable Euro Style Override Lock

RFID/Keypad Series

Dual Factor Authentication

10-digit PIN Style Keypad

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EN2.0 Network Management Card

High Visibility Data Display

Critical Alarm Icons

- PDU Alarm
- Cascade Error
- Environmental Alarm
- Security Alarm
- Circuit Breaker Alarm

Interactive Display

Select

Scroll

Menu

Power-saving sleep mode

USB-C

Future-proof, local upgrades and expanded sensor support

Gbit Ethernet

Primary network connection

Tool-less Installation

Quick hot-swap replacement and rotation for proper orientation

10/100 Ethernet

Redundancy and high-bandwidth cascading port

Dual Digital Sensor Ports

Plug-and-play management of external environmental sensors & security devices

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Power Source Color Coding

POWER SOURCE COLOUR FOR ALL USERS

- Standard design feature, no long lead time/special colour order codes
- User selectable seven (7) colour code border (for source identification)
- Distinctive Contrast
- No Extra Cost to Implement

Edit

LED Edge Color

LED Edge Color
PDU will reboot after saving changes.
Pink

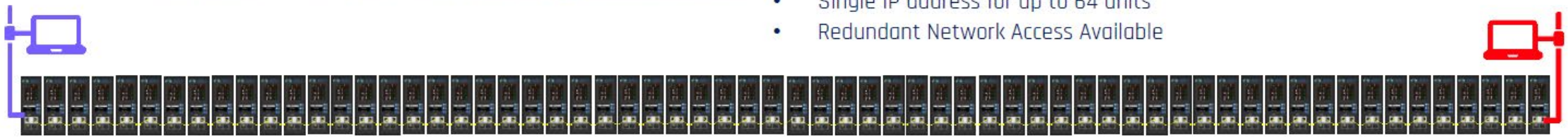
- Red
- Green
- Yellow
- Blue
- Pink
- Cyan
- White

64x Daisy Chain Testing

64 PDUs • Single Ethernet IP Address • DNA Enabled

EN2.0 Series

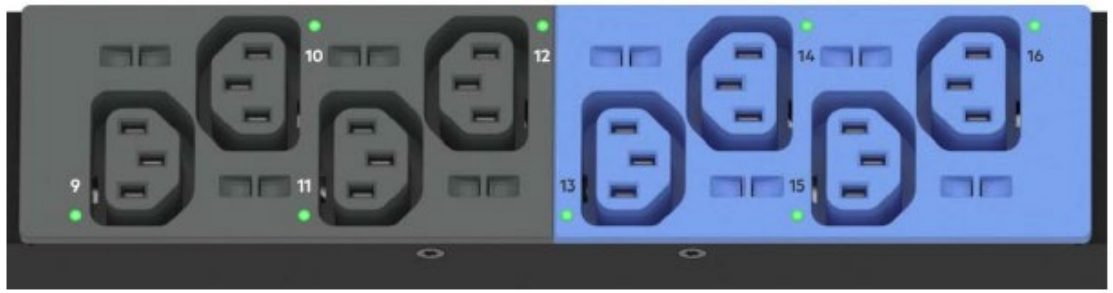
- Ethernet Cascading
- Standard ethernet cable between units for easy cabling
- Single IP address for up to 64 units
- Redundant Network Access Available



Enlogic Sequential Start Up

Why do we need Sequential Start Up?
If you have multi-power installations, you need fast and secure start up sequences.
Non -switched PDU's draw power from the mains supply in one surge, this potential huge draw on the power supply can cause potentially damaging surges and cause outages which can cause major downtime.

Enlogic offer Sequential Start Up on our EN6000 NE &2000 Advantage Series PDU's helping you to reduce total in -rush currents to a minimum. By setting the on/off position of each socket and also setting a timed delay on each outlet you can reduce the initial power draw and also the timing of when your equipment will get powered. The more installations you have, the greater the benefit Enlogic Switched PDU's can have on your network.



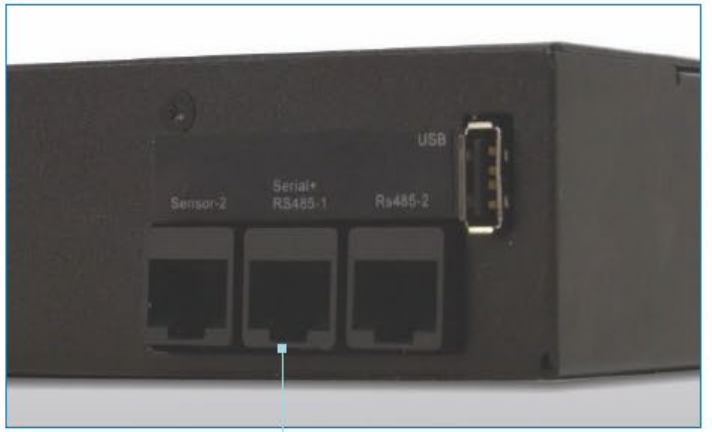
EN Series 1U & 2U Horizontal PDU's

- Available in 4 options
- Overall Metered, 16A & 32A options
- Switched Outlet 16A & 32A options
- Power & Energy Metering (V, A, VA, W, Kwh, PF) to 1% billing grade accuracy
- Daisy-chain up to 4 Horizontal PDU's with environmental monitoring, with support for up to 8 sensors

- Vertical Hot Swappable Network Management Card

± 1%
REVENUE GRADE

- Locking IEC receptacles provide secure power connection with optional Locking Cords



EZ Series-InLine Meters (ILM's)

Rewireable input cord

High Accuracy, billing-grade power metering
(Includes V, A, VA, W, pf, kWh)

Large, high visibility oLED display with localised language options

Bracketry available for Zero U, 1U or outside of the rack-space installation

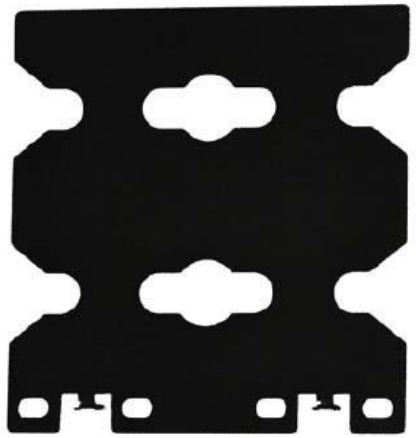
Environment monitoring ready with up to 8x plug and play probes and sensors

Full featured network management and alerts including HTTP, HTTPS, SSH, Telnet, SNMP, FTP

- Inline Energy Meters (EZ Series), real time input circuit level monitoring solution for adding network monitoring to basic PDU's or stand alone equipment
- The EZ series boasts billing grade power and energy metering and can connect EN Series sensors for complete threat detection and notification

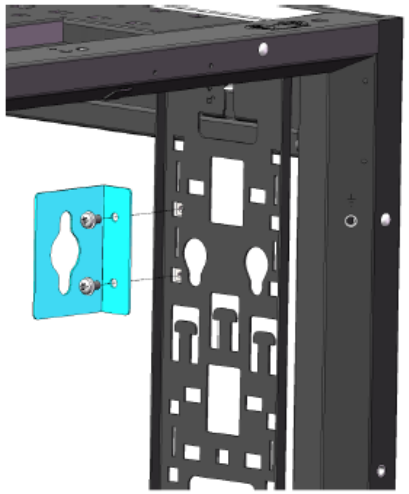
Providing intelligence to unmonitored equipment

Tool -less Rack Mounting System Enlogic



Rittal / HP Bracket
EA9120

APC / Right Angled Bracket
EA9121



Universal Bracket
EA9122

Enlogic brackets allow for easy access into any manufacturer rack to best position your rack PDU within your cabinet

PDU Warranty

~~enLOGIC 3 YEAR WARRANTY GUARANTEE~~

2.0 now comes with a 5 Year Warranty

And comes with complete technical back up and support from the UK

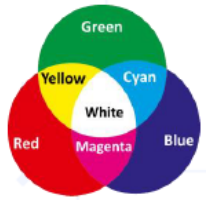
EN2.0 Series PDU Features

5 Year Warranty
Full technical support on all EN2.0 products

Designed for High Temperature
Safe, Reliable Operation at Full Load Rating

HIGH-TEMP RATED 60°C

Hot Swappable Colour Coded Network Card
For easy maintenance and upgrade-ready



Locking IEC Outlets
Provide secure power connection with optional locking cords or integrated locking features

Power and Energy Metering
(V, A, VA, W, kWh, pf)

Dual Network Access
Network Redundancy solution for Mission critical applications

TEMP-STABLE

Premium Hy-Mag Circuit Breakers
5kAIC standard, 10kAIC optional

Industry Leading Low Profile Design
Industry leading design saves rack space and ensures good access

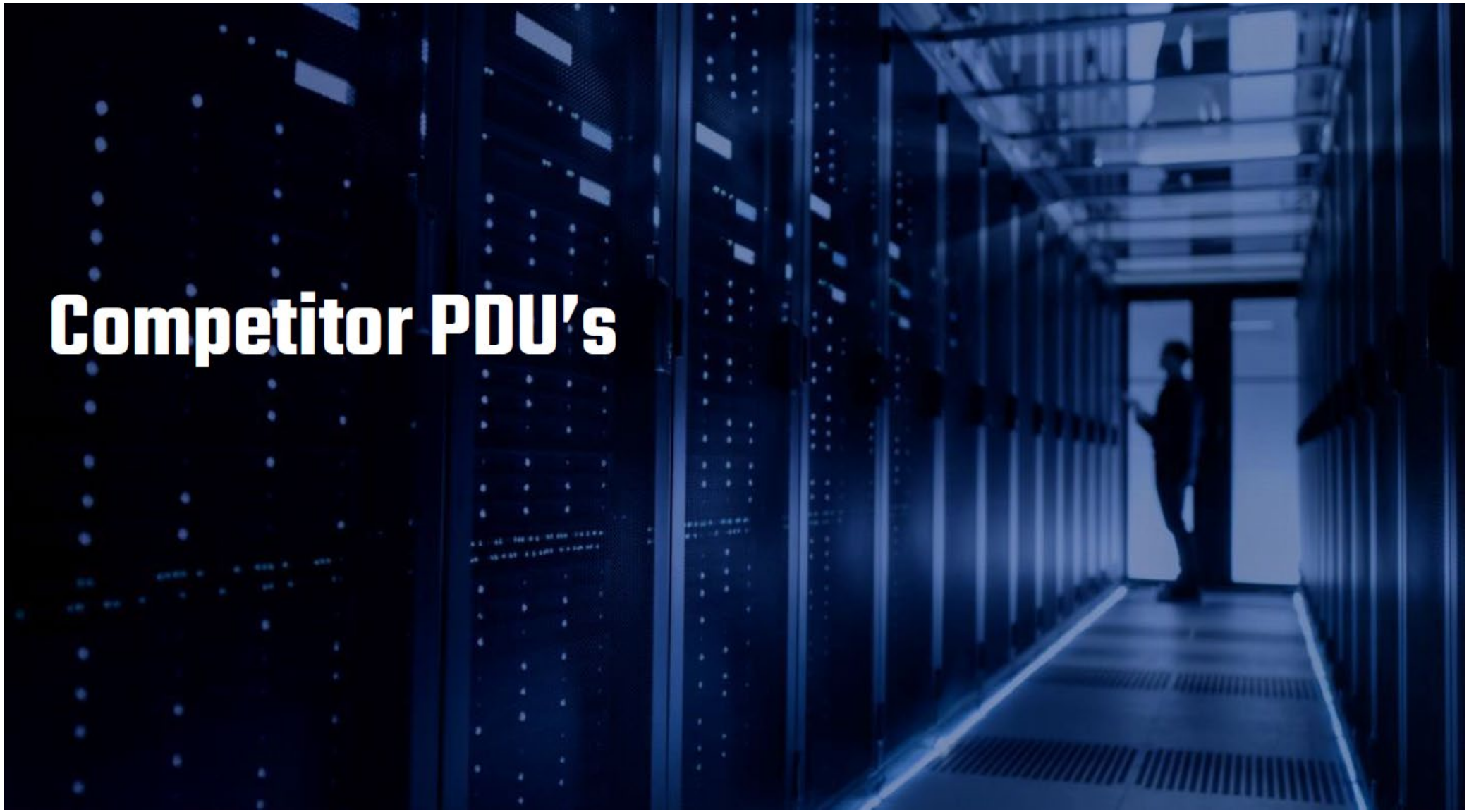
Color Coded Outlets & Circuit Breakers
For easy source Identification

Tool-less Mounting System
For easy fitting into racks

± 1% REVENUE GRADE

Best-in-Class Billing Grade Accuracy
Certified ISO/IEC 62053-21 across full range of operational spec

64x PDU Cascading
Industry first for bi-directional 64x PDU daisy chain, including DC Power Sharing


Competitor PDU's

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PDU Detailed-Competitive Comparison

☑ Standard Feature ⓪ Optional Feature (in some SKUs)	Enlogic by nVent	Legrand Raritan	Legrand Servertech	Schneider APC	Vertiv (Geist)	Eaton	Regional Players
Global Product Portfolio	☑	☑	☑	☑	☑	☑	
High kVA Solutions	☑	☑			☑		
Technology Leaders	☑	☑					
Gigabit Ethernet Support	☑	☑	☑				
Redundant Network Support	☑	☑	☑		⓪		
DC Power Share Redundancy	☑	☑					
Dual Network Access Redundancy	☑						
Advanced Sensor Support	☑	☑	☑	`	☑		
Electronic Security Handles	☑	☑					
Billing Grade Accuracy	☑	☑	☑	⓪	☑	☑	
Advanced 64 Unit Cascading	☑						
Hi-Vis, Color Code Display	☑	`	`				
Customization Capability	☑	☑			☑		☑
Willingness to Private Label	☑						☑
Global Mfg Footprint	China, India, USA	Taiwan	USA, S. Korea	India	USA, China, Europe	Morocco, China	Various

CIS PDU offer is highly competitive; Speed, Flexibility & Innovation

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PDU Platform Comparison (Enlogic– APC)

CIS Advantage	Differentiation	APC Next Gen
Yes	Billing Grade Meter Accuracy (+/- 1%)	No
Yes	Tool-less Hot-Swap Network Card	No
60°C	Standard Temperature Rating	45°C
Yes	Gigabit Ethernet	No
Yes	Dual Network Ports	No
Yes	DC Power Sharing	No
Yes	Dual Network Access	No
Yes	Electronic Color Coding	No
Yes	Dual Display	No
Yes	Supports Electronic RF Door Handles	No
8 per PDU	Environmental Sensors	1 combo
Yes	Local USB Upgrades	No
Yes	Tool-less Removal	No
64 max	Daisy Chain Cascading	4 max
Yes	Mobile Friendly Web UI	No

PDU Platform Comparison (Enlogic– Geist/Vertiv)

CIS Advantage	Differentiation	Geist / Vertiv
Yes	Billing Grade Meter Accuracy (+/- 1%)	Yes
Yes	Tool-less Hot-Swap Network Card	Yes
60°C	Standard Temperature Rating	50°C (half power)
Yes	Gigabit Ethernet	No
Yes	Dual Network Ports	No
Yes	DC Power Sharing	No
Yes	Dual Network Access	No
Yes	Electronic Color Coding	No
Yes	Dual Display	No
Yes	Supports Electronic RF Door Handles	Yes
8 per PDU	Environmental Sensors	2
Yes	Local USB Upgrades	Yes
Yes	Tool-less Removal	No
64 max (bi-dir)	Daisy Chain Cascading	50 max (one way)
Yes	Mobile Friendly Web UI	No

PDU Platform Comparison (Enlogic– Austin Hughes)

CIS Advantage	Differentiation	Austin Hughes
Yes	Billing Grade Meter Accuracy (+/- 1%)	Yes
Yes	Tool-less Hot-Swap Network Card	Yes
60°C	Standard Temperature Rating	60°C
Yes	Gigabit Ethernet	No
Yes	Dual Network Ports	No
Yes	DC Power Sharing	No
Yes	Dual Network Access	No
Yes	Electronic Color Coding	No
Yes	Dual Display	No
Yes	Supports Electronic RF Door Handles	Yes
8 per PDU	Environmental Sensors	1 combo
Yes	Local USB Upgrades	No
Yes	Tool-less Removal	No
64 max (bi-dir)	Daisy Chain Cascading	16 (with dongle)
Yes	Mobile Friendly Web UI	No

סדרת Enlogic PDU

סדרת EN2.0 מביאה איתה המון יתרונות וממקמת את ה PDU של אנלוג'יק כמוצר מוביל ומועדף בכל חוות שרתים.

- חלוקה לצבעים שונים על גבי ה PDU לטובת זיהוי קל של חיבורים שונים וניתוק ציוד המחובר לאותו צבע על ידי מפסק
- טמפרטורת עבודה עד 60 מעלות
- שקעים מותאמים לכבלי נעילה לטובת אבטחה וללא ניתוק
- חלוקת השקעים מסודרת בצורה כזו שמגבירה את השרידות
- תצוגת LED של התראות קריטיות כגון נפילת מתח, תקלה בשרשור ,התראה של אחד מהרגשים
- התצוגה היא אינטראקטיבית וניתן לבצע שינויים בלחיצה על מסך המגע
- כניסת USB" לטובת עדכונים מקומיים, הוספת רגשים, והוספת אביזרים עתידיים.
- 2 כניסות רשת, האחת במהירות ג'יגה לטובת ביצועים מהירים –יותר והשנייה לשרשור ולשרידות לחיבור מקור נוסף
- 2 כניסות לרגשים- ניתן לחבר עד 8 סנסורים
- החלפה חמה של המוח ללא צורך בכלים- במידה וישנה תקלה, ניתן להחליף את המוח בלבד ללא ניתוק כלל ה PDU והשבתת חדר השרתים.
- פטנט בלעדי של אנלוג'יק, ניתן להגדיר צבע תצוגה שונה מתוך 7 צבעים אפשריים ובכך לזהות את מקור המתח המחובר ל PDU.
- ניתן גם להזמין את המוצר בצבעים שונים, בהזמנה מיוחדת

Advice PDU video

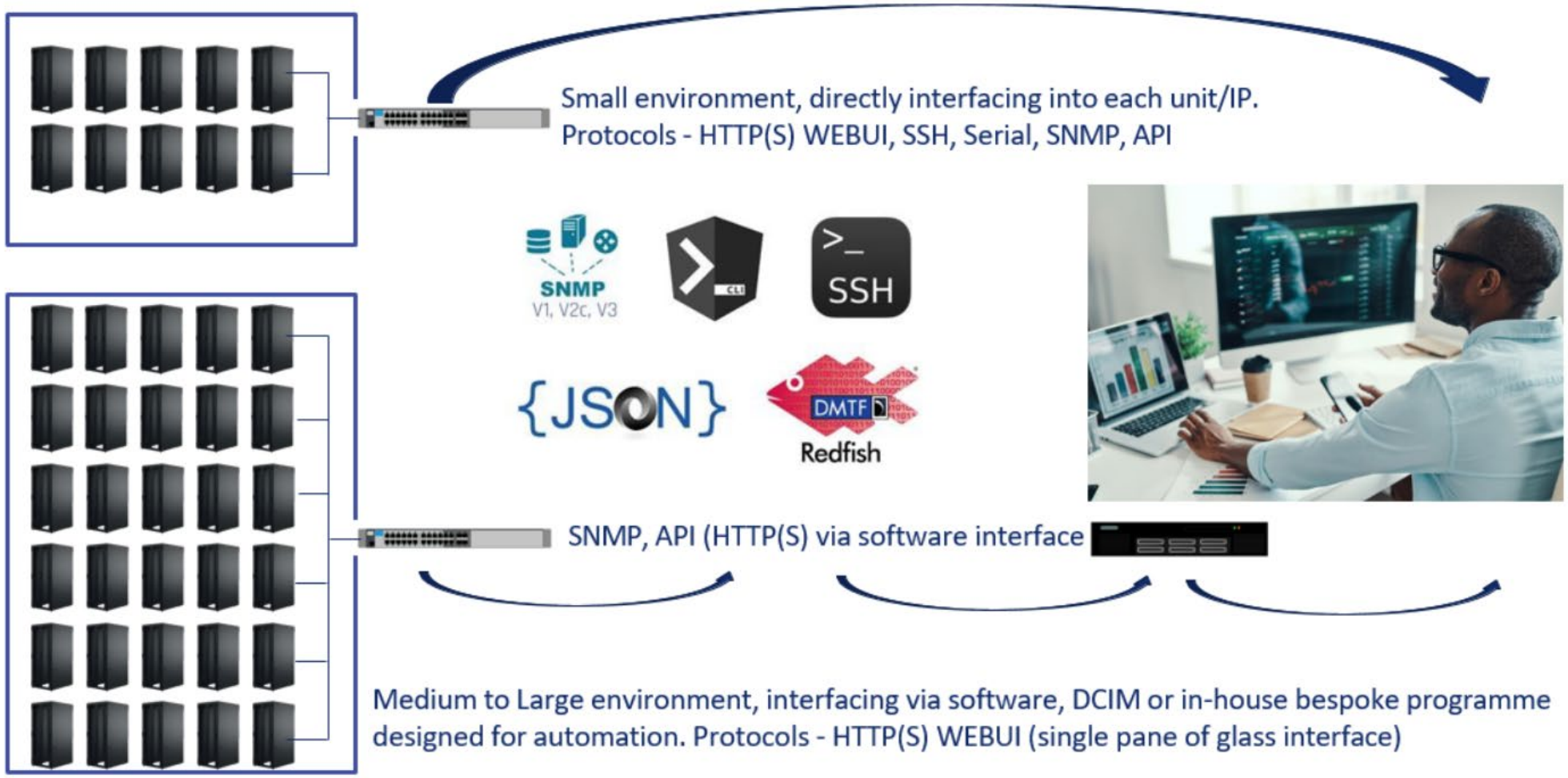
תודה רבה על ההקשבה!

ADVICE
Creative Technology Solutions

ENLOGIC PDU Series
Management & Monitoring Tools

ברק ברכה
מנהל טכני תקשורת ומחשוב
אדוויס אלקטרוניקה בע"מ

Monitoring scenarios



ENLOGIC PDU Series
Management Tools & Features

PDU connectivity Protocols:

- **Serial**
- **HTTP/ HTTPS**
- **Telnet/SSH**
- **SNMP**
- **JSON, Redfish API, and others**

Advanced Security Features:

- **Strong encryption**
- **Passwords Management**
- **advanced authorization options including LDAP and Active Directory**

ENLOGIC PDU Series
Management Tools & Features

- NMC- Network Management Controller
  - ניהול מקומי (On-Premise)
- LAN Based Management
  - PCT tool
  - ניהול מבוסס רשת (GUI/ SSH מקומי או מרוחק)
- Remote Monitoring
  - ממשקים ופרוטוקולים
  - חיבור למערכות שו"ב

NMC: Network Management Controller

- Features
- Ethernet Cascading
- DC power Sharing
- On-Premise Management

SNMP
V1, V2c, V3

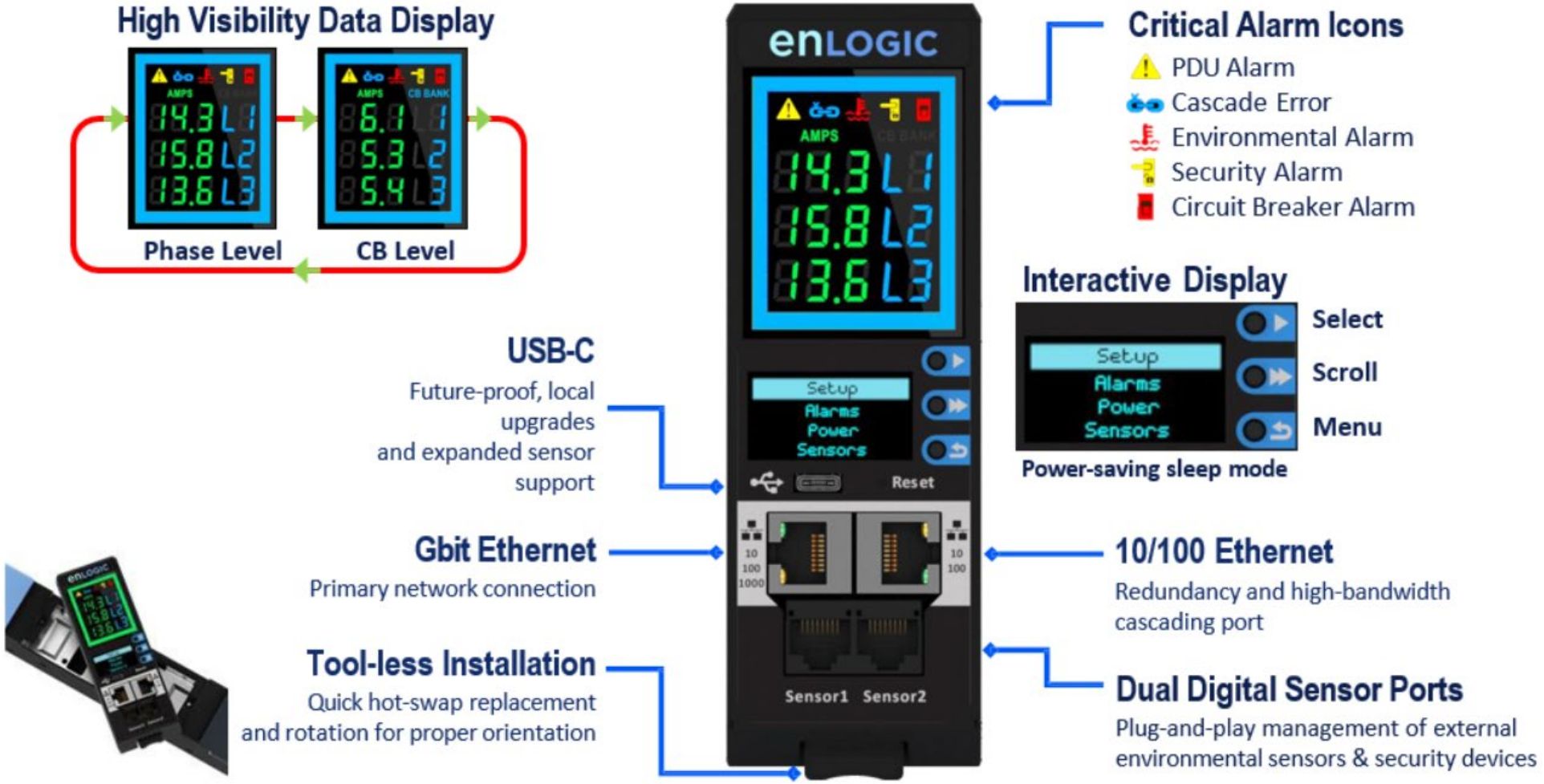
CLI

SSH

{JSON}

DMTF
Redfish

EN Series Network Management Card



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EN Series Network Management Card

Remote Connectivity

IPv4 IPv6

SNMP V1, V2c, V3

CLI SSH

{JSON} DMTF Redfish

LDAP TLS 1.2 HTTPS

RADIUS

Processor Power

DNA

Dual Network Access (DNA) in 2N configuration for tenant/client applications

Firmware Linux

Mobile Display

React

High Accuracy

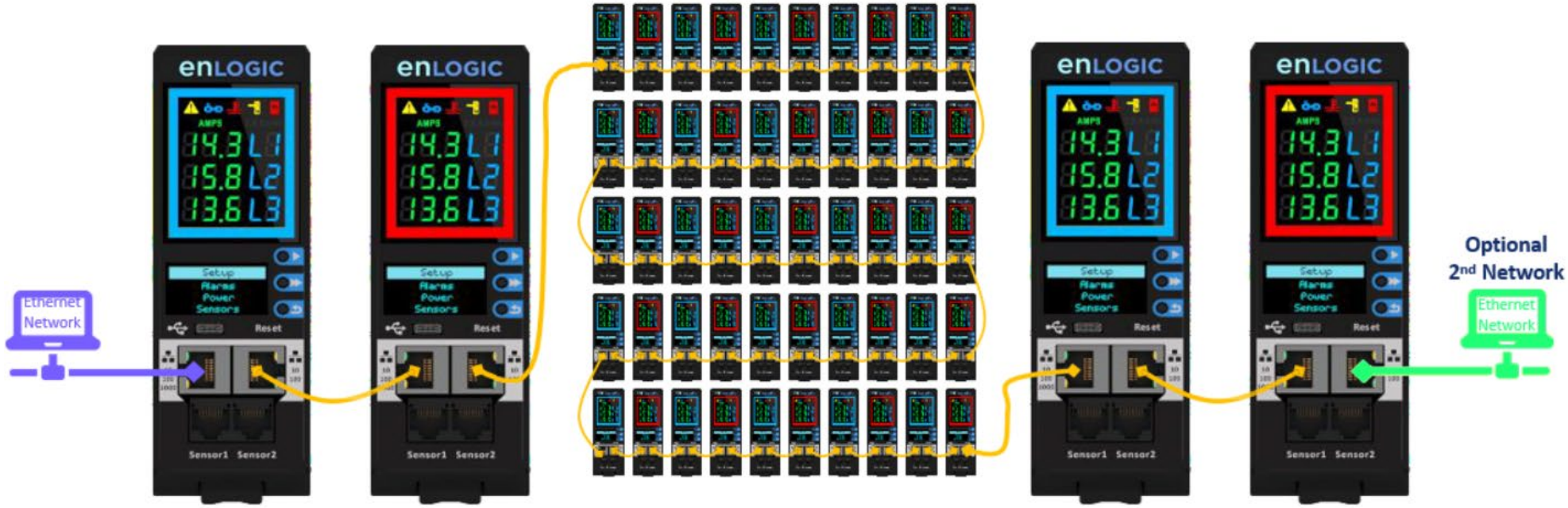
Best in-class billing grade accuracy (IEC62053-21) at full power and across the whole range

± 1% REVENUE GRADE

Ethernet Cascading

- Simplifies Connectivity & Access
- Use simple Ethernet cable
- Up to 64PDUs
- Single *or* Redundant Ethernet IP Address
- DNA Enabled *or* RNA Enabled

- **DNA (Dual Network Access):** Typically used for separate access to the same device (client access for billing and monitoring)
- **RNA (Redundant Network Access):** Typically used on a 2N network redundancy



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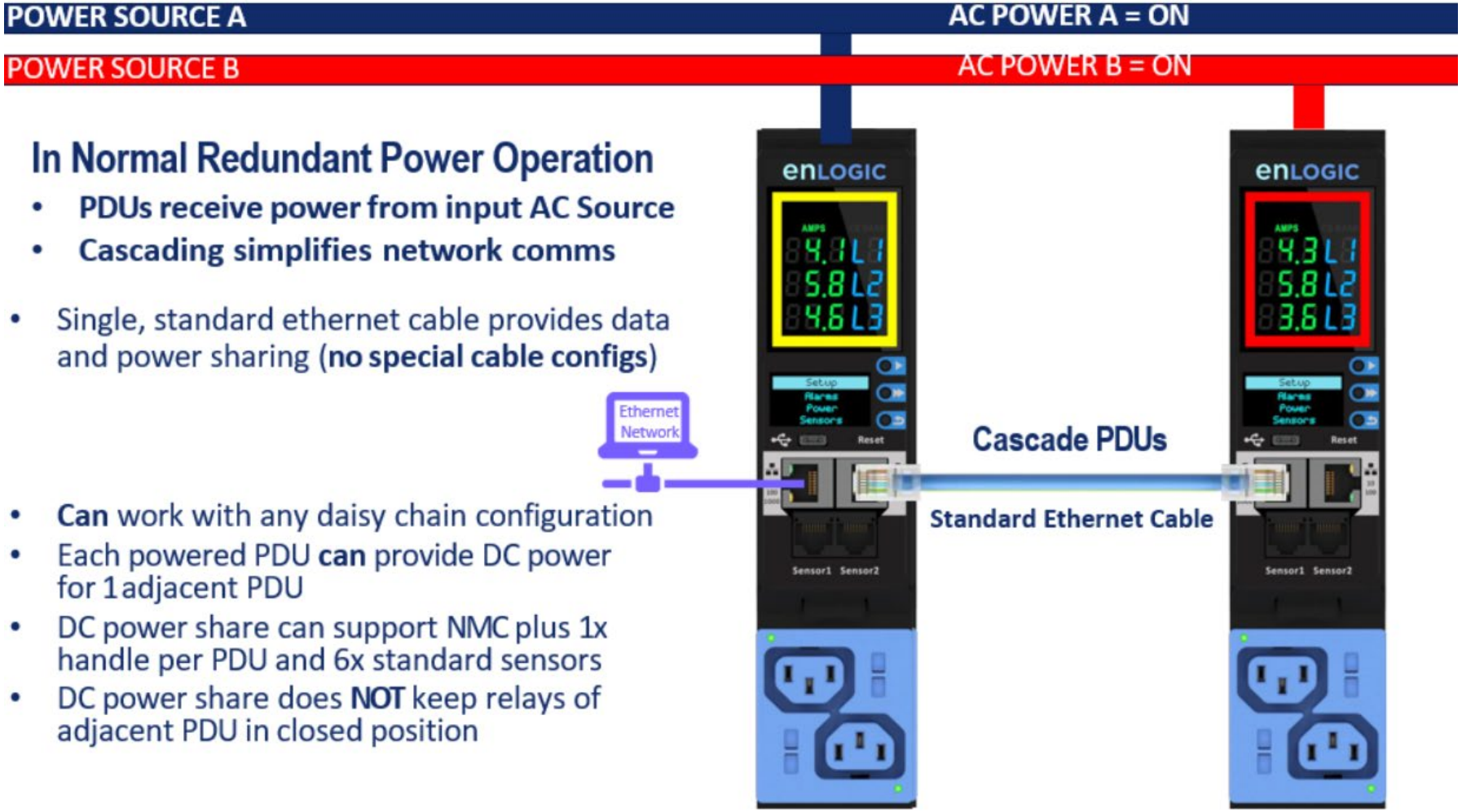
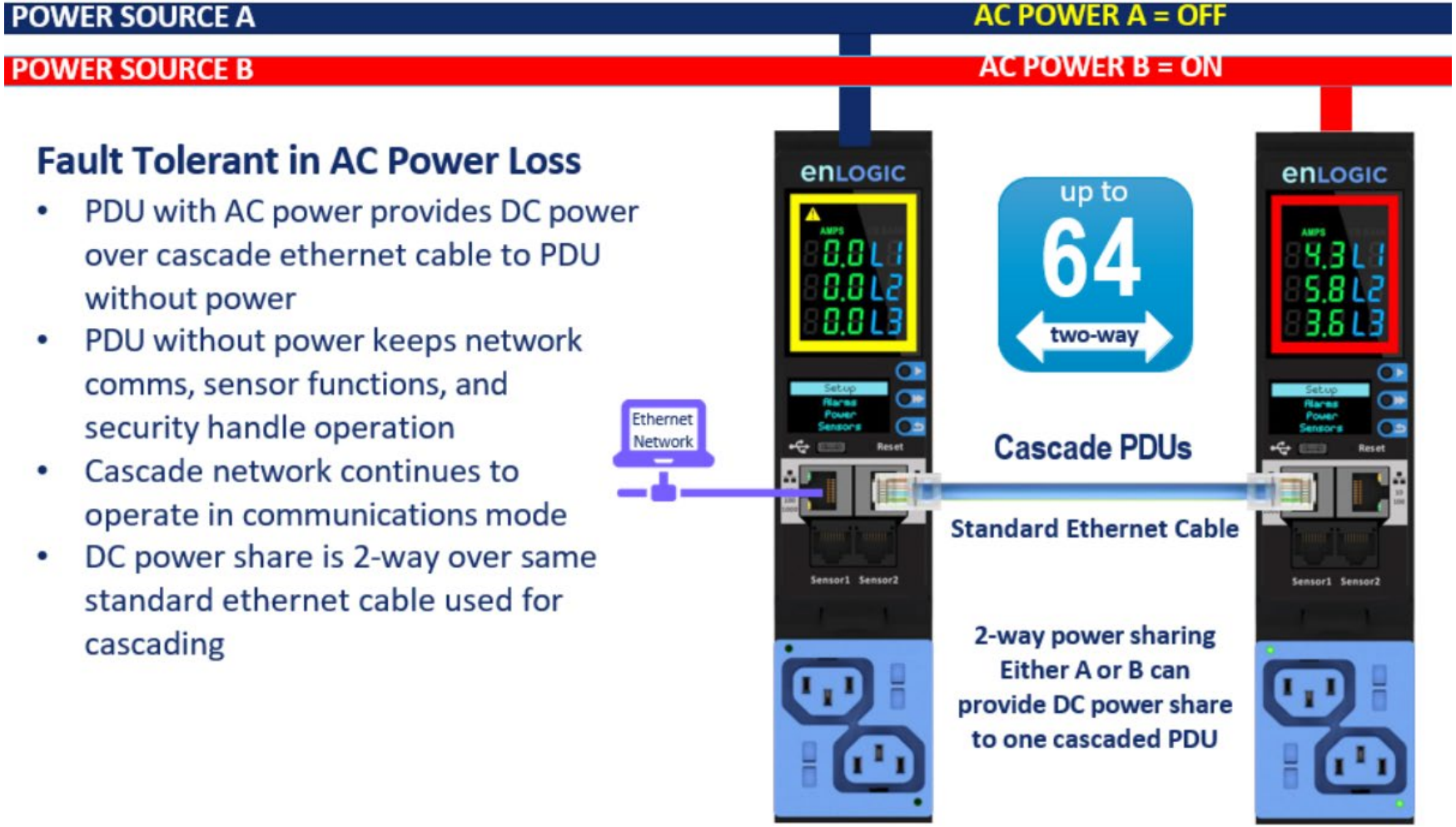
64x Daisy Chain Testing

DC Power Sharing (over Cascade)



DC Power Sharing (over Cascade)



CLI: Serial / SSH

```
sys: system setting
usage:
        sys [date/time/ntp] [2012-09-11/14:16:20/133.100.11.8 133.100.11.9 (ser
        sys [ver/def/rst]
    sys upd [conf/all]
        sys log [del|edit] [event|data] [on|off] [interval]
        sys ledcolor [pduid]/all] [dark/red/green/yellow/blue/pink/cyan/white]
        sys dualinput get
        sys dualinput set [NA/EMEA]


user: user setting
usage:
        usr list
        usr login
        usr unlock [username]


net: network configuration command
usage:
        net [ssh/ftps/http/https/redfish] [on/off]
        net [snmp] [v1v2c/v3/trap] [on/off]
        net [mac/tcpip]
        net tcpip [eth0dhcp/eth1dhcp/eth0static/eth1static ip nm gw]
        net ip [v4] [v4v6]
        net phy [auto/10100mbps]
        net cert [def]


dev: device setting
usage:
        dev daisy [rna/qna] [init] [create]
        dev outlet pduID [status/outletindex] [on/off]
        dev [sensor/usb] [on/off]
        dev hid [cold/hot] [lock/unlock]
        dev ledstrip [on/off]
        dev powershare
        dev ehandle [pduID] [cold/hot] [lock/unlock]


pwr: pdu information
usage:
        pwr [unit/phase/cb/outlet] [idx]
```

CLI Commands Table

The following is a list of commands available in the CLI to execute. The commands are divided into 5 main categories: System setting (sys), Network configuration (net), User setting (usr), Device setting (dev) and Power (pwr).

Table 5: Sys Commands

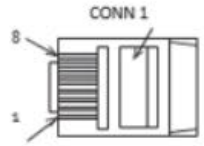
Sys Commands	Description	Example
sys date [yyyy-mm-dd]	Sets the user input date	EN2.0>sys date 2013-08-12 SUCCESS
sys date	Query on PDU date	EN2.0>sys date SUCCESS Date:2013-08-12 Time:04:58:16
sys time[hh:mm:ss]	Sets the user input time	EN2.0>sys time 09:20:50 SUCCESS
sys time	Query on PDU time	EN2.0>sys time SUCCESS Date:2013-08-12 Time:09:20:53
sys ntp [primary_ip] [secondary_ip]	Sets the NTP	EN2.0>sys ntp 129.6.15.28 129.6.15.29 SUCCESS
sys ver	Query on the system versions – firmware, web, boot loader and language version	EN2.0>sys ver SUCCESS Firmware Version: 1.0.6.1 Boot loader Version: 1.1 LANGUAGE Version: 1.01 Web Version: 1.0.5.8

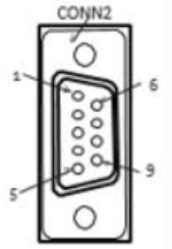
List of CLI commands included in the manual

Serial RS232 via RJ45 – Sensor port 1 is the serial port. Ensure where serial is used that the allocation for sensors is adequate.

Serial cable has a unique pinout

Pin	Description	Pin
1		1
2	RS232 RX	2
3	RS232 TX	3
4		4
5	Ground	5
6		6
7		7
8		8





ADVICE

ES Series Network Management Card

Low-Power LED Graphical Display

USB-A
Firmware, configuration and Data Downloads

Daisy Chain Out
For cascading (up to four units)

Digital Sensor Port 1
Supports up to 8 sensor data points

User Interactive Buttons
For setup and detailed information

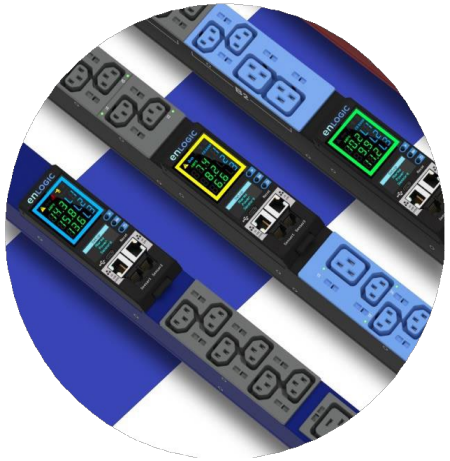
10/100/1000 Ethernet
Primary network connection

Daisy Chain In and Serial
For cascading (up to four units)

Digital Sensor Port 2
External Sensors & Peripherals

Network Based Management

- PCT Tool
- HTTP/ HTTPS
- SSH



SNMP
V1, V2c, V3

CLI

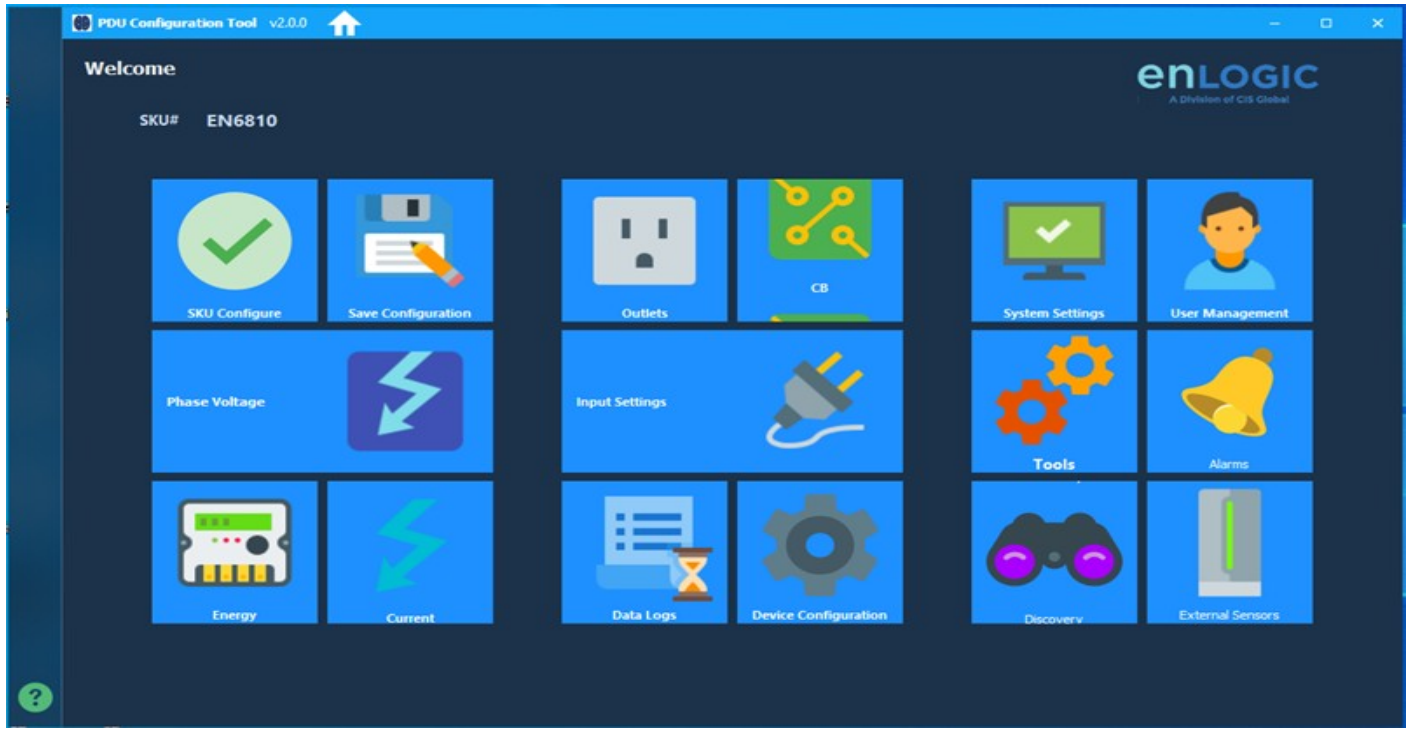
SSH

{JSON}

DMTF
Redfish

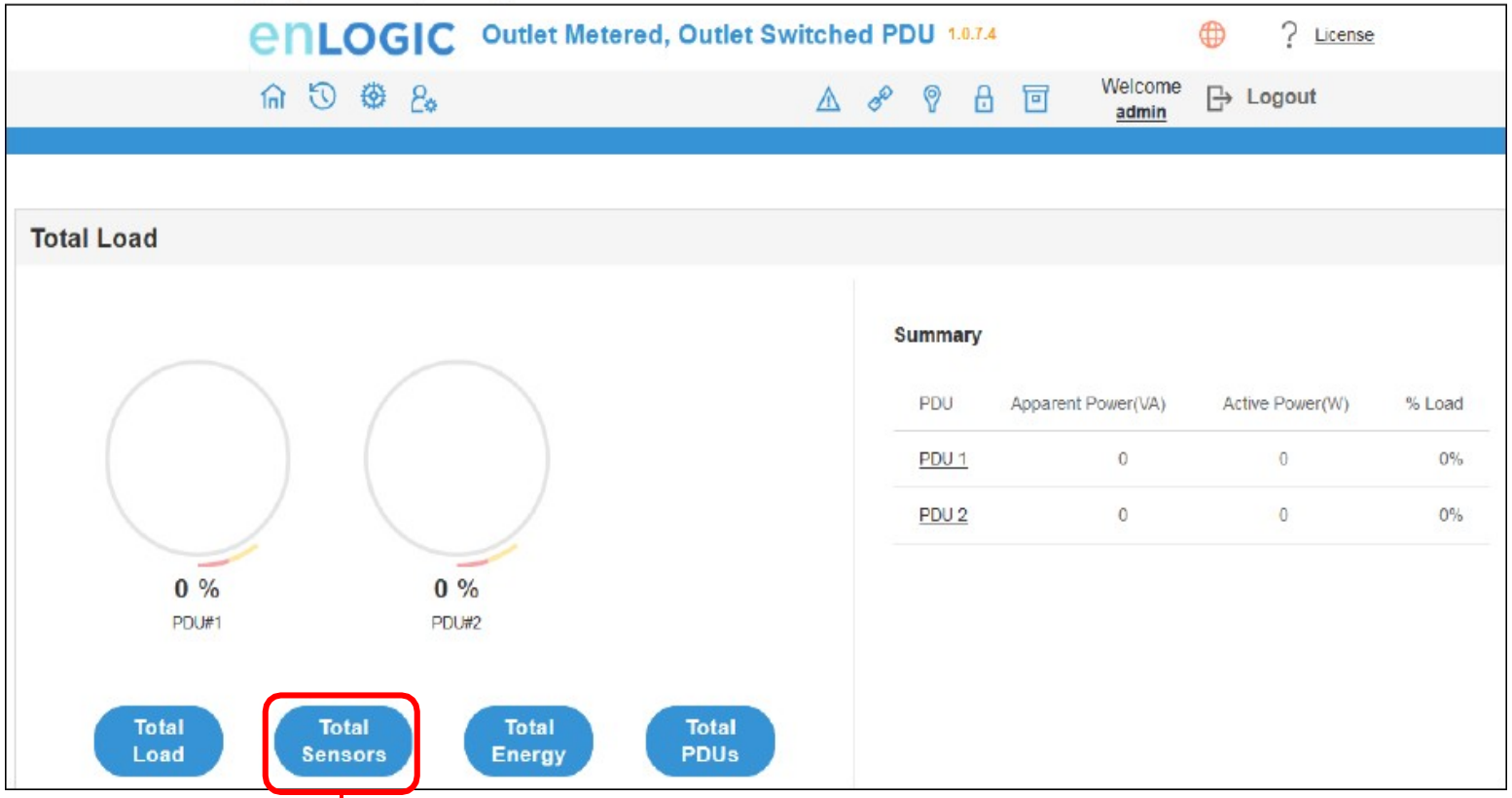
PCT Tool

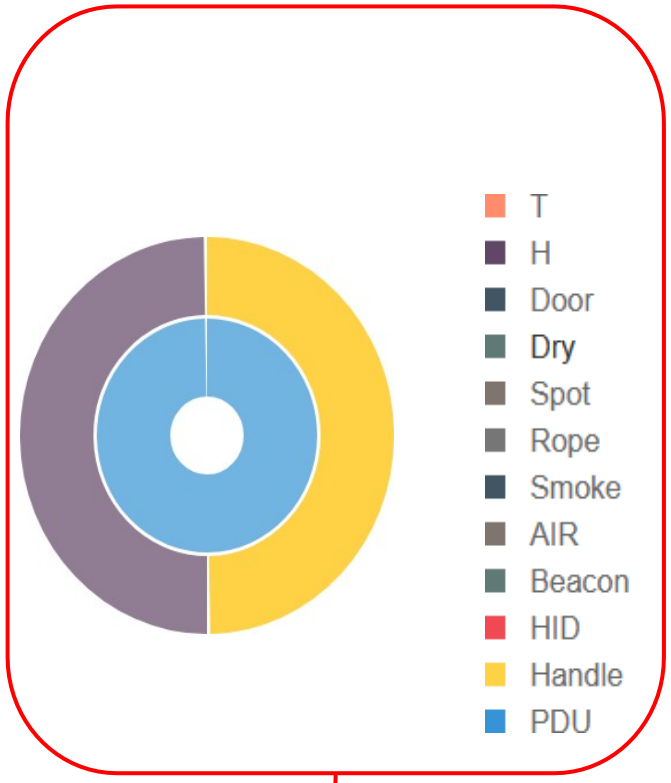
- Firmware updates & PDU configurations via the PCT Tool
- Free end-user utility for PDU deployment and updating
- Auto-discover network attached PDUs
- Bulk update PDU firmware
- Configure PDU settings and save/maintain PDU configuration files
- Bulk upload PDU configuration files to network attached PDUs
- Download PDU settings and logs



Interface UI

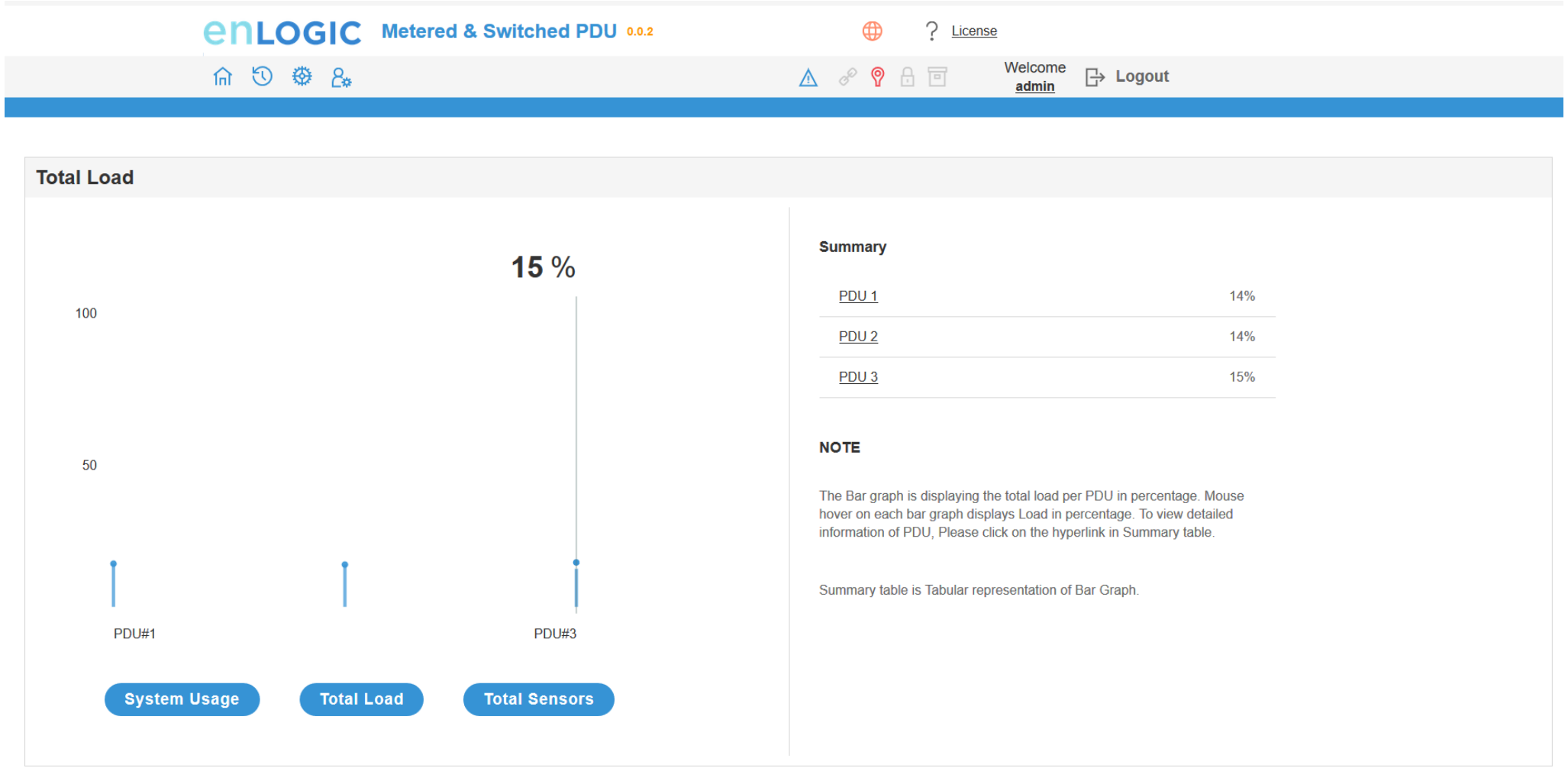
This is the landing page once you login.



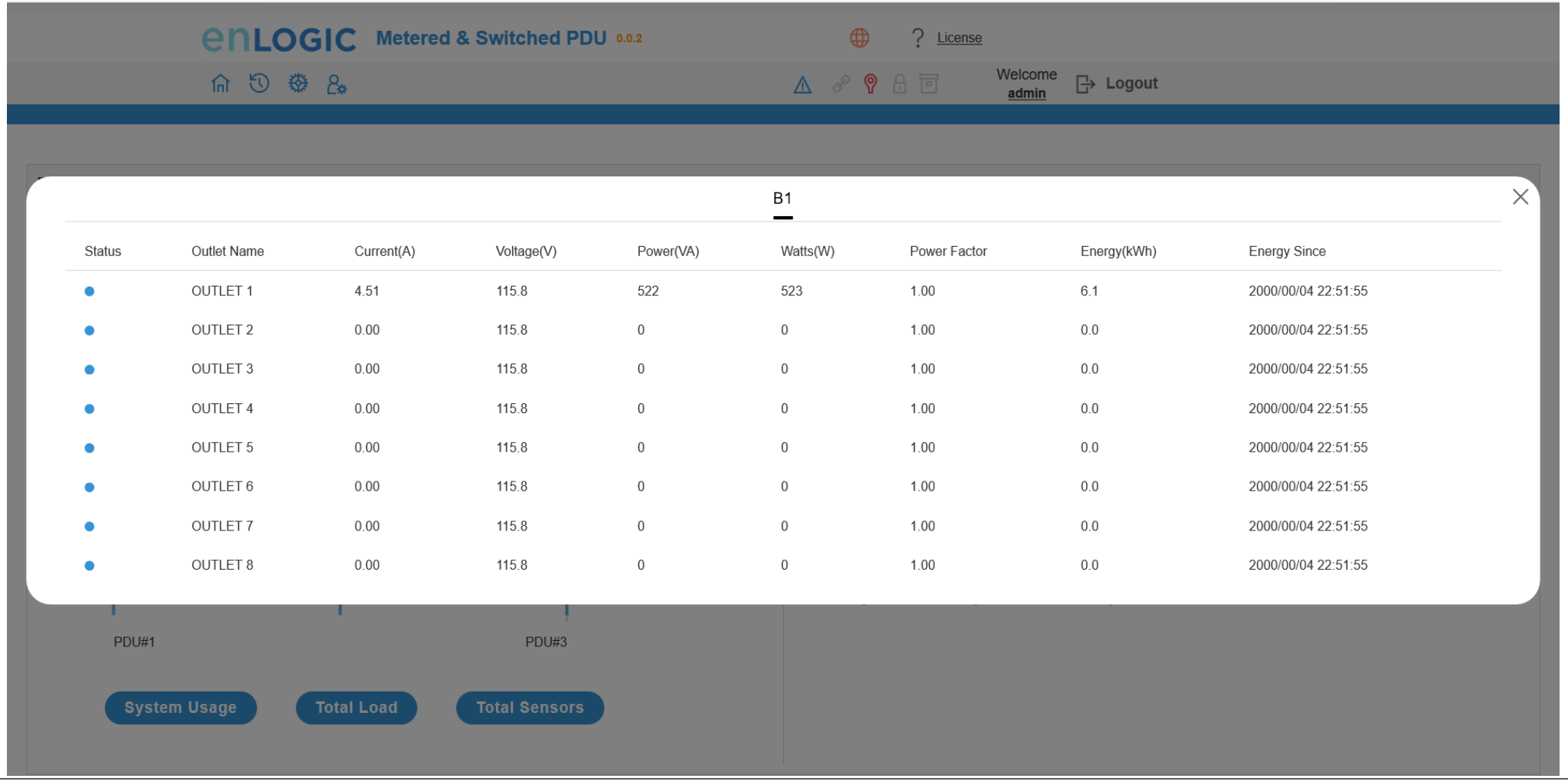


ADVICE

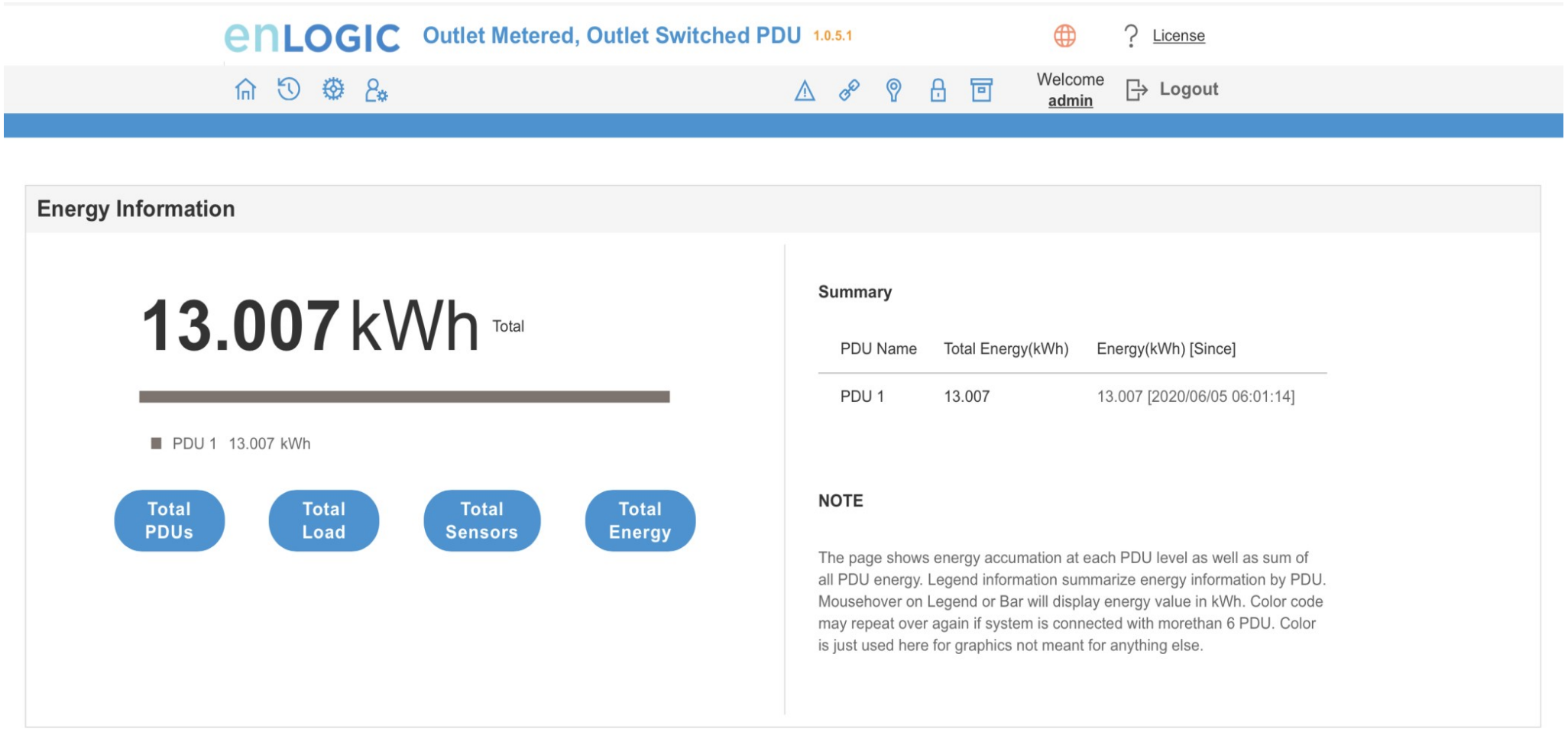
Power Usage



Outlet Detail



Energy Usage



PDU Thresholds

PDU Thresholds

Device Detection Threshold

Threshold(mA) 150

Power Threshold | Input Phases | Circuit Breaker | Control Management | External Sensors

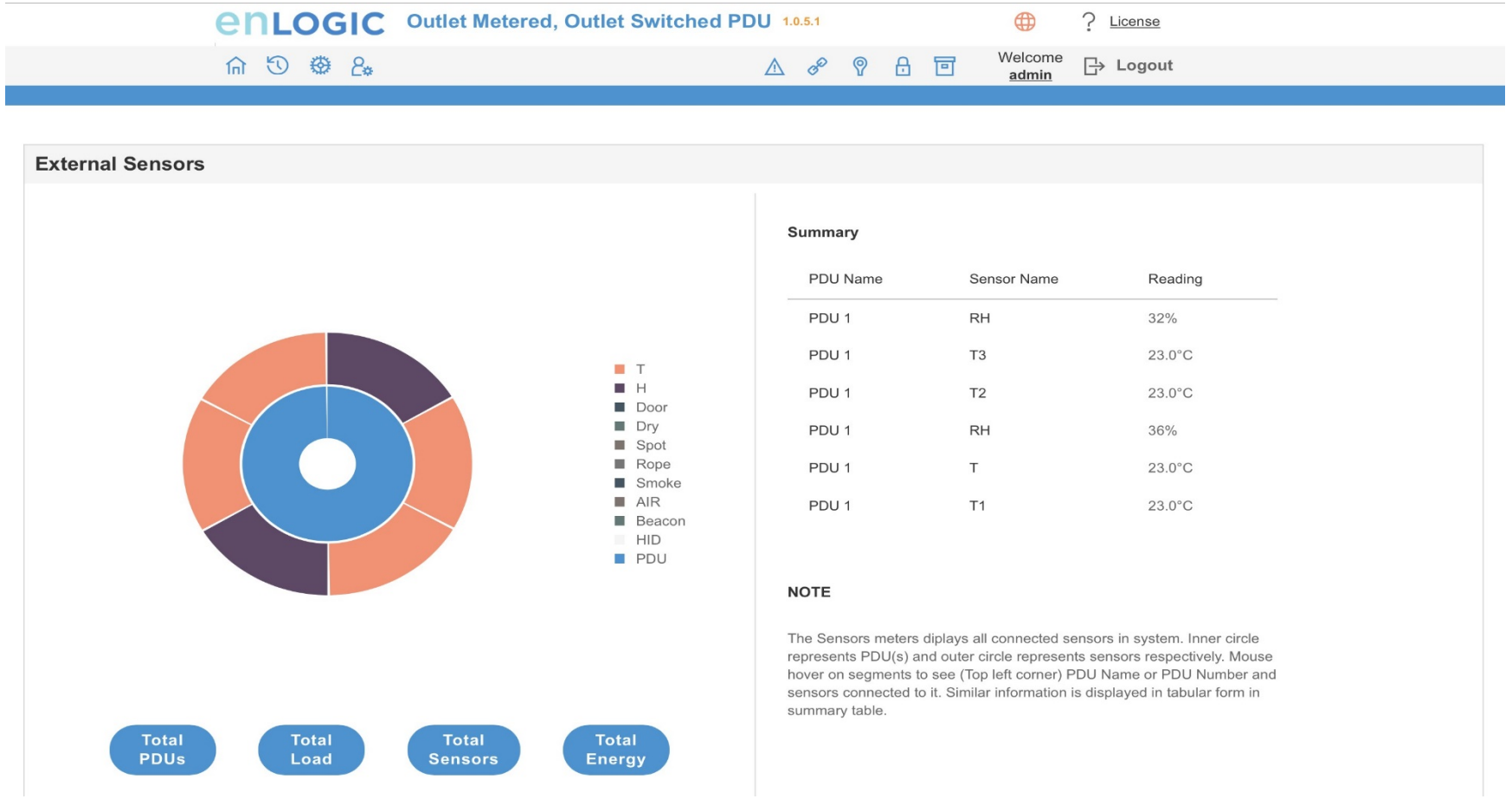
1

Phase Current	Reading(A)	Low Critical	Low Warning	High Warning	High Critical
Phase1	8.2	0.0	0.0	21.0	24.0

Phase Voltage	Reading(V)	Low Critical	Low Warning	High Warning	High Critical
Phase1	233.6	180.0	190.0	215.0	225.0

External PDU Sensors

Sensors and PDU dependency shown on an easy to identify dashboard.



ADVICE

External PDU Sensors

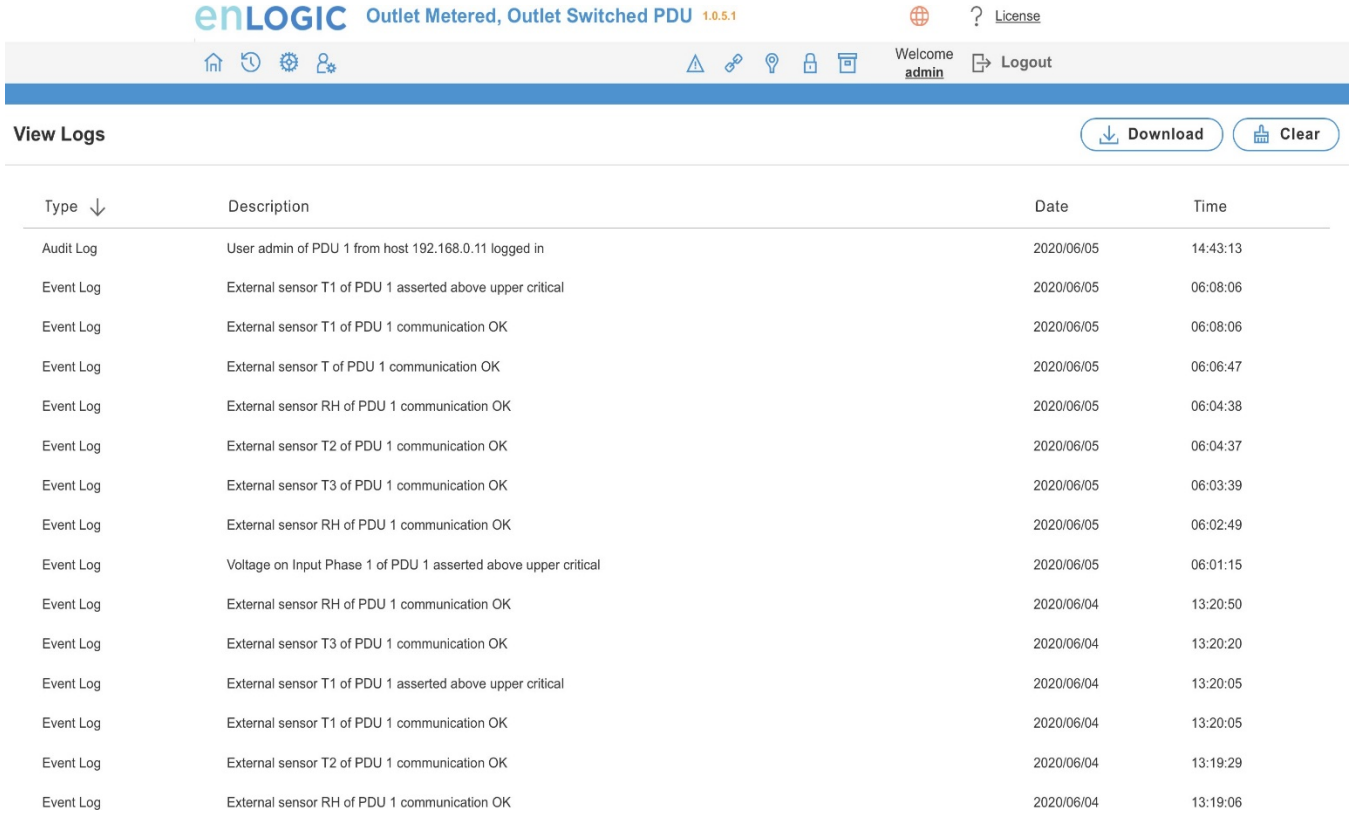
External Sensors

External Sensors, Type	Sensor Name	Serial Number	Sensor ID	PDU	Location
Humidity	RH	A2FLB0532	1	PDU#1	
Temperature	T3	A23MB0684	2	PDU#1	
Temperature	T2	A23MB0684	3	PDU#1	
Humidity	RH	A23MB0684	4	PDU#1	
Temperature	T	A2FLB0532	5	PDU#1	
Temperature	T1	A23MB0684	6	PDU#1	

Previous Next

Log View

Event and Data logs hold a capacity of 15000 entries and will recycle on a first in first out basis. Granularity of one minute to 24 hours options available for logging intervals



Type	Description	Date	Time
Audit Log	User admin of PDU 1 from host 192.168.0.11 logged in	2020/06/05	14:43:13
Event Log	External sensor T1 of PDU 1 asserted above upper critical	2020/06/05	06:08:06
Event Log	External sensor T1 of PDU 1 communication OK	2020/06/05	06:08:06
Event Log	External sensor T of PDU 1 communication OK	2020/06/05	06:06:47
Event Log	External sensor RH of PDU 1 communication OK	2020/06/05	06:04:38
Event Log	External sensor T2 of PDU 1 communication OK	2020/06/05	06:04:37
Event Log	External sensor T3 of PDU 1 communication OK	2020/06/05	06:03:39
Event Log	External sensor RH of PDU 1 communication OK	2020/06/05	06:02:49
Event Log	Voltage on Input Phase 1 of PDU 1 asserted above upper critical	2020/06/05	06:01:15
Event Log	External sensor RH of PDU 1 communication OK	2020/06/04	13:20:50
Event Log	External sensor T3 of PDU 1 communication OK	2020/06/04	13:20:20
Event Log	External sensor T1 of PDU 1 asserted above upper critical	2020/06/04	13:20:05
Event Log	External sensor T1 of PDU 1 communication OK	2020/06/04	13:20:05
Event Log	External sensor T2 of PDU 1 communication OK	2020/06/04	13:19:29
Event Log	External sensor RH of PDU 1 communication OK	2020/06/04	13:19:06

ADVICE

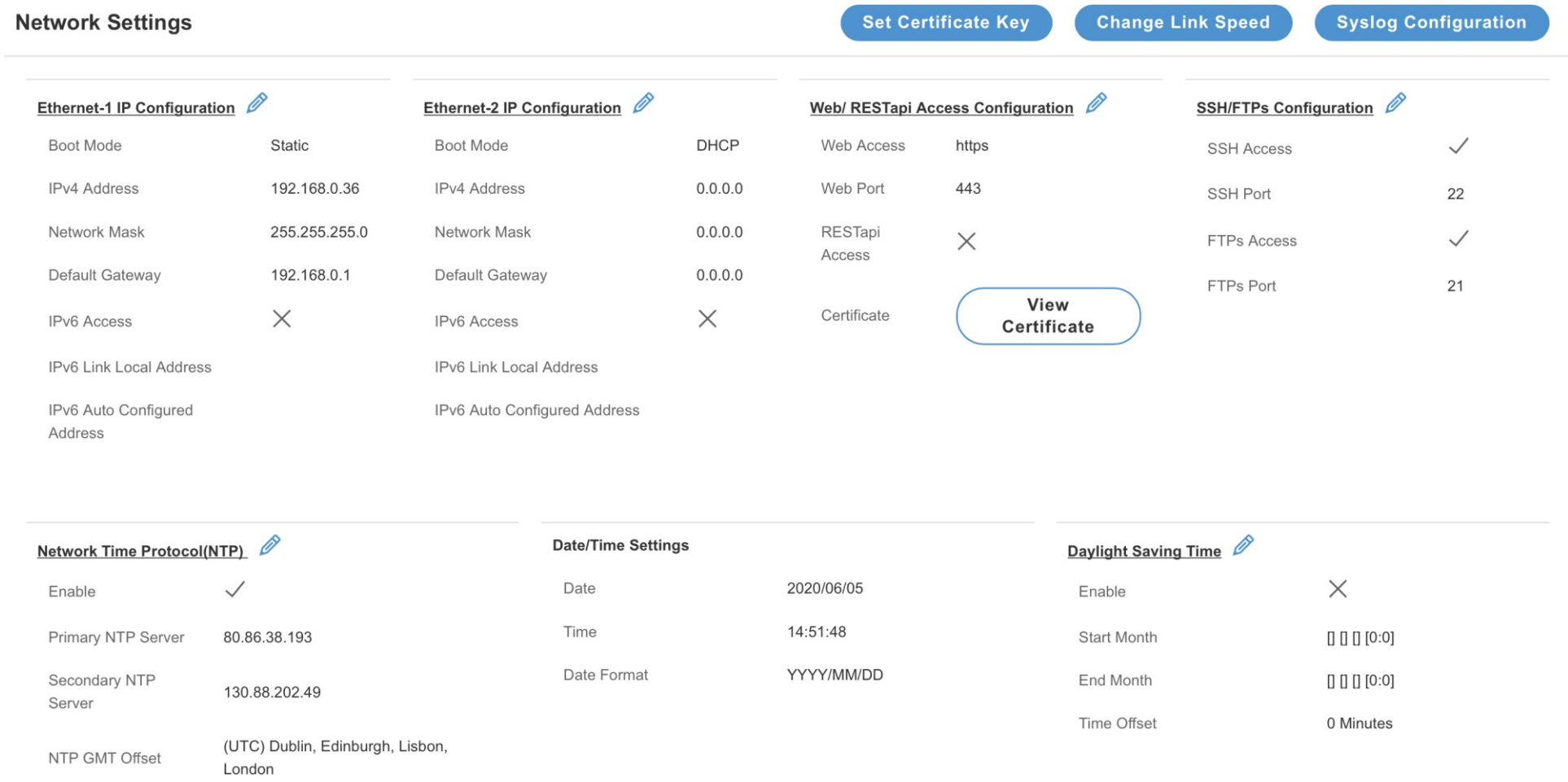
Event Notifications

Extensive options for coverage of event notifications via email, SNMP or syslog.

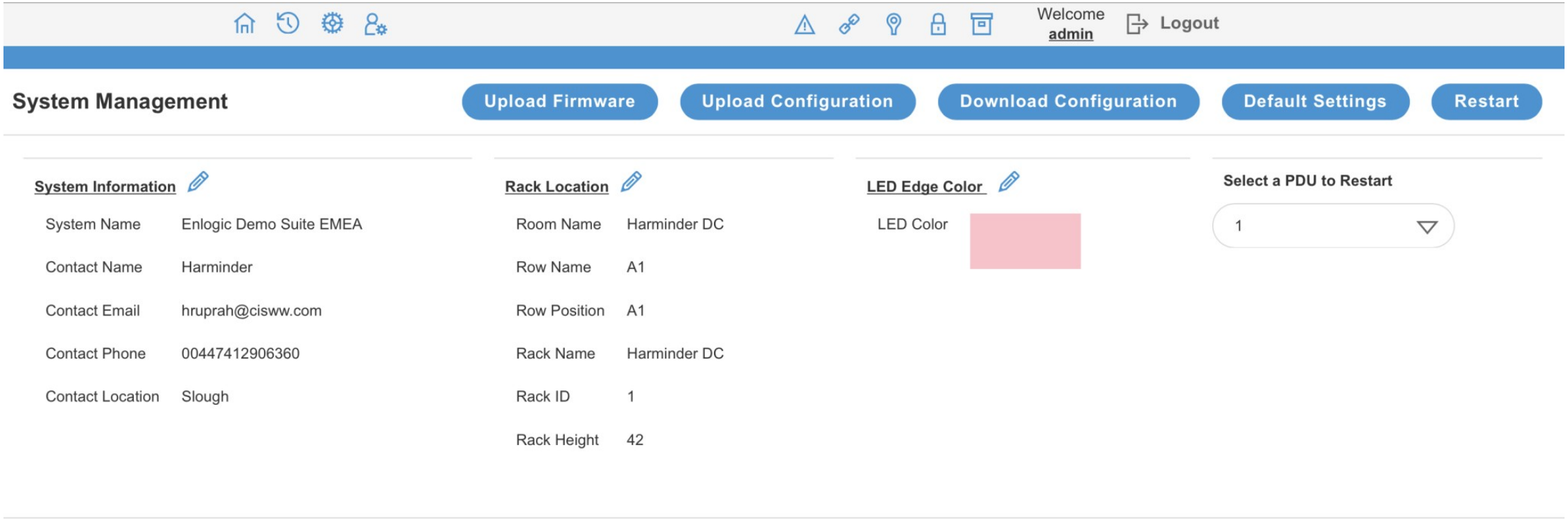
Event Notifications

Events	Email	SNMP Trap	Syslog
Circuit Breaker Status Changed			
User Activity			
Smart Rack Access			
Outlet Power Control Status Changed			
User Status Changed			
Critical Alarm			
Warning Alarm			
Password/Settings Changed			
Network Card Reset/Start			
External Sensor Status Changed			
PDU Configuration File Imported/Exported			
User Role Status Changed			
Firmware Update			
Communication Status Changed			
Daisy Chain Status Changed			
Enter Bootloader Mode			
LDAP/Radius Error			

Network Settings



PDU System Management



Monitoring interface and protocols

- SNMP V1/2/3
- RESTful API – JSON
- RESTful API – Redfish

SNMP
V1, V2c, V3

CLI

SSH

{JSON}

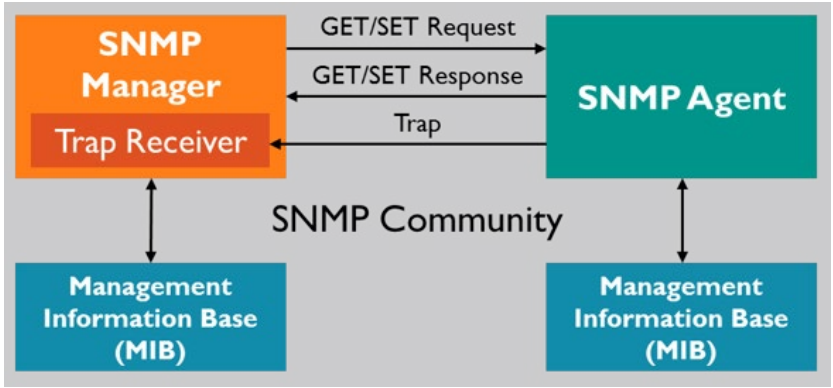
DMTF
Redfish

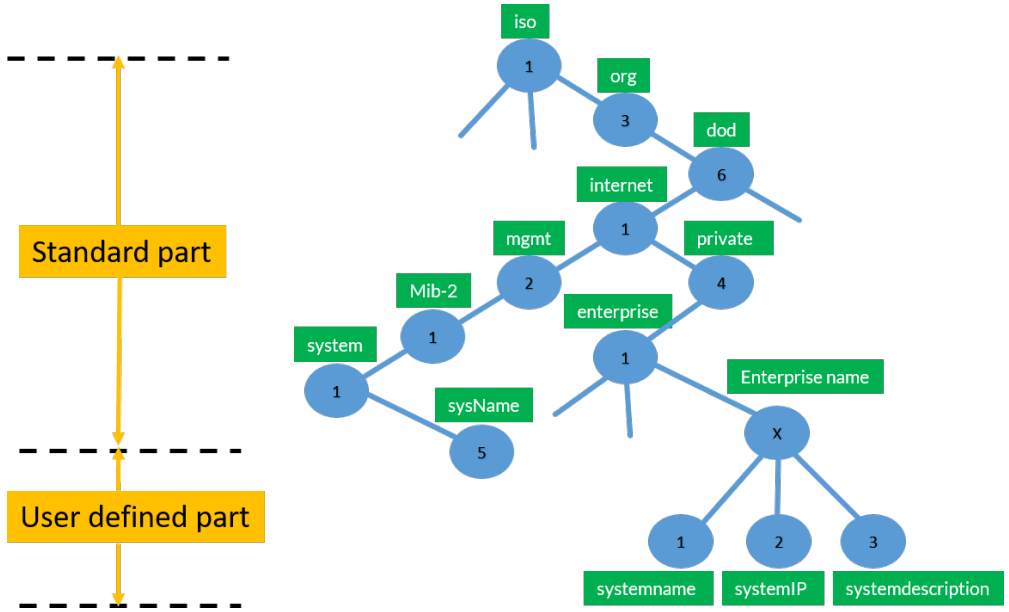
SNMP

Application layer protocol - SNMP effectively aids the monitoring of network infrastructures such as data stations, printers, servers, hubs, routers, WINS, and host configurations. Today, it is still one of the most widely used layer protocols for simple networks.
Simple Network Management Protocol (SNMP) offers easier identification and management of network devices. It makes real-time monitoring of the status of your network accurate and dependable. It also makes the management of online communication protocols possible. SNMP evolves and develops with every new version to deliver better features and functionalities.

Network management protocols like SNMP have made identification and management of network devices easy and convenient. The protocol keeps track of changes in the network and relays the status of all network devices in real time.

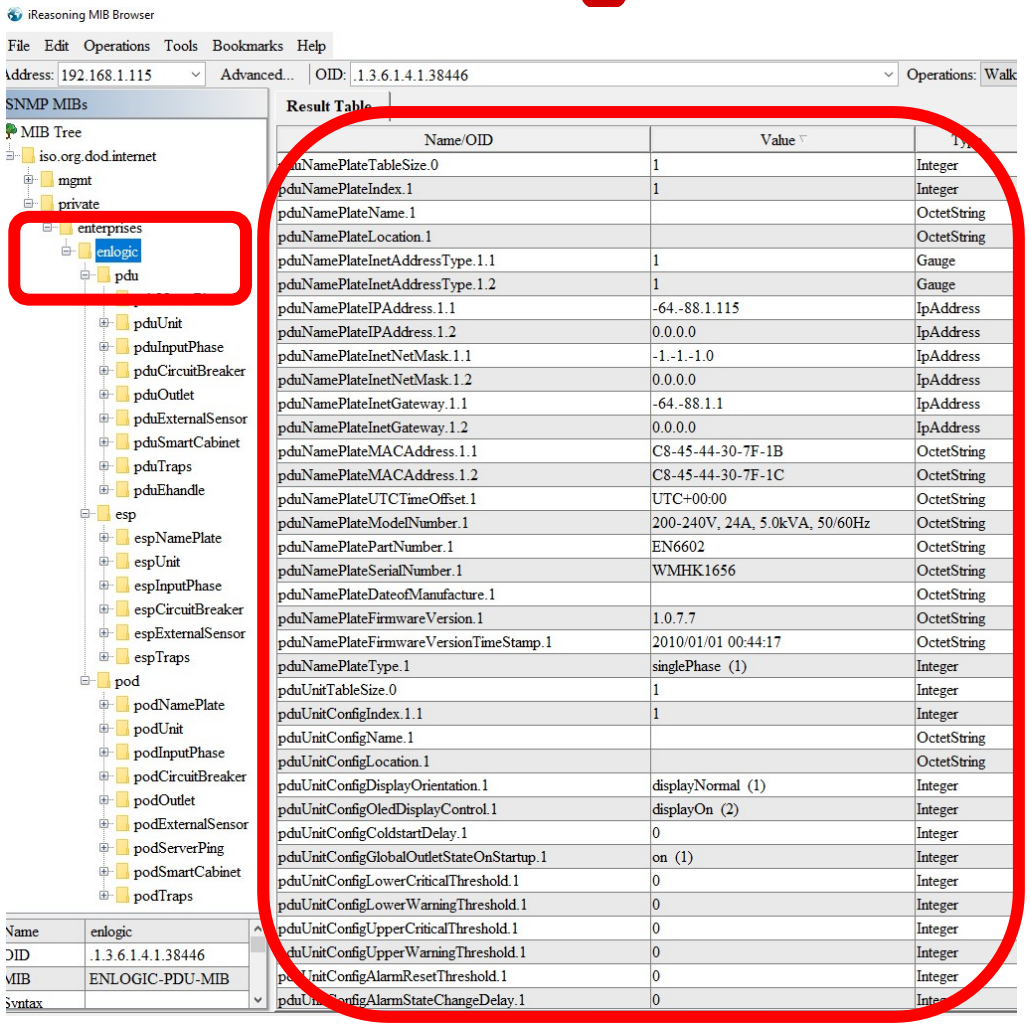
As the name hints, SNMP has a simple architecture which is based on the client's server technology. Basically, the server is the network manager; it measures different variables and processes data relayed from different devices on the
internet network. Client devices on SNMP networks are referred to as "Agents." The agents are either computing devices or peripheral devices connected directly or indirectly to the network. They include computers, phones, printers, and network switches, among other devices.



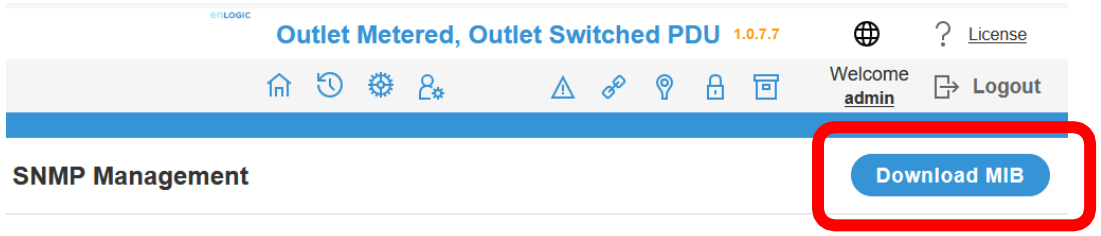


Enlogic Enterprise OID .1.3.6.1.4.1.38446

SNMP – Enlogic MIB



SNMP V1/2/3 supported
Enlogic's Enterprise MIB (management information base) can be downloaded from the PDUs web UI, or website. The MIB allows name friendly name identification of the OID (Object Identifier), as well as OID type, Integer, Gauge, OctectString, Counter etc;



https://www.enlogic.com/public/

enlogic.com/public/assets/images/1623333611-Enlogic_2.0_v1.4APR2021.mib

```
ENLOGIC-PDU-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE     FROM SNMPv2-SMI
    enterprises, Integer32, Unsigned32, IpAddress       FROM SNMPv2-SMI
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP FROM SNMPv2-CONF
    TEXTUAL-CONVENTION, DisplayString, MacAddress, TruthValue  FROM SNMPv2-TC
    InetAddressType, InetAddress FROM INET-ADDRESS-MIB
    sysDescr,sysContact, sysName, sysLocation FROM RFC1213-MIB;

enlogic MODULE-IDENTITY
```

RESTful / JSON / Redfish / APIs

REST has been employed throughout the software industry and is a widely accepted set of guidelines for creating stateless, reliable web APIs. A web API that obeys the REST constraints is informally described as RESTful. RESTful web APIs are typically loosely based on HTTP methods to access resources via URL-encoded parameters and the use of JSON or XML to transmit data.

{json:api}

JSON in RFC since 2006 – Standardised 2013 – Very popular Restful API
JSON or JavaScript Object Notation is an encoding scheme that is designed to eliminate the need for an ad-hoc code for each application to communicate with servers that communicate in a defined way.

Over the last 15 years, JSON has become ubiquitous on the web. Today it is the format of choice for almost every publicly available web service, and it is frequently used for private web services as well.

The popularity of JSON has also resulted in native JSON support by many databases. Relational databases like PostgreSQL and MySQL now ship with native support for storing and querying JSON data.

DMTF Redfish since 2015 focusing and expanding on server and systems management now extended to include other PCI, local and network storage, memory, BMC management controllers, multifunction adapters, modern interface, tools readily avail in redfish standard, combination has made it available on implementation and client software side

DMTF Redfish

Used with common scripting languages Python, C++, Java, Javascript, Ruby, C#

Retrieve "IPMI class" data
- Basic server identification and asset info
- Health state
- Temperature sensors and fans
- Power supply, power consumption and thresholds

Basic I/O infrastructure data
- Host NIC MAC address(es) for LOM devices
- Simple hard drive status / fault reporting

Discovery
- Service endpoint (network-based discovery)
- System topology (rack/chassis/server/node)

Security
- Session-based leverages HTTPS

Perform Common Actions
- Reboot / power cycle server
- Change boot order / device
- Set power thresholds

Access and Notification
- Serial console access via SSH
- Alert / event notification method(s)
- Event Log access method(s)

BMC infrastructure
- View / configure BMC network settings
- Manage local BMC user accounts

Working on more…

RESTful / JSON / Redfish / APIs

```
rawData = urllib.urlopen('http://192.168.1.135/redfish/v1/Systems/1')
jsonData = json.loads(rawData)
print( jsonData['SerialNumber'] )
```

Redfish URLs Supported with GET Method

Session Service

S.No	URL
1	https://<ip_addr>/redfish/v1/
2	/redfish/v1/SessionService
3	/redfish/v1/SessionService/Sessions
4	/redfish/v1/SessionService/Sessions/{session_ids}

Account Service

S.No	URL
1	/redfish/v1/AccountService
2	/redfish/v1/AccountService/Accounts
3	/redfish/v1/AccountService/Accounts/{username}
4	/redfish/v1/AccountService/Roles
5	/redfish/v1/AccountService/Roles/{rolename}

Managers

S.No	URL
1	/redfish/v1/Managers
2	/redfish/v1/Managers/manager
3	/redfish/v1//Managers/manager/NetworkProtocol
4	/redfish/v1//Managers/1/LogServices
5	/redfish/v1//Managers/1/LogServices/Log
6	/redfish/v1//Managers/1/LogServices/Log/Entries

Metrics

S.No	URL
1	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Metrics

Enlogic URLs supporting Redfish V

- Session
- Account
- Managers
- Metrics
- Power Equipment
- Branches (Breaker)
- Outlets
- Sensor
- Accounts
- OutletControl

GET https://10.10.105.219/redfish/v1

Pretty Raw Preview Visualize JSON


```
{
    "Id": "RootService",
    "AccountService": {
        "@odata.id": "/redfish/v1/AccountService"
    },
    "JsonSchemas": {
        "@odata.id": "/redfish/v1/Schemas"
    },
    "@odata.type": "ServiceRoot.v1_6_0.ServiceRoot",
    "Name": "Redfish Root Service",
    "@odata.id": "/redfish/v1",
    "Manager": {
        "@odata.id": "/redfish/v1/Managers"
    },
    "PowerDistribution": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs"
    },
    "SessionService": {
        "@odata.id": "/redfish/v1/SessionService"
    },
    "Links": {
        "Session": {
            "@odata.id": "/redfish/v1/SessionService/Sessions"
        }
    },
    "EventService": {
        "@odata.id": "/redfish/v1/EventService"
```

תודה רבה על ההקשבה!