Distribution Training

Platypus
the nPLC gateway to IoT

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Foundation Software
Core business activities

- engineering and consulting services for embedded: compilers, operating systems, and performance optimisations

- contract development of embedded system solutions

- development and licensing of runtime solutions, management platforms and board-level products for connected devices in identification, telemetry and telematics applications
Platypus interfaces

Flexible IO interfaces

- USB2.0 RNDIS Ethernet adapter
  - connecting nPLC to the Internet
  - can be used to power the device

- 0 - 10V DC
  - light dimming
  - ...

- RS 458
  - bridging and endpoint
  - DMX lighting control
  - up-to 1M BAUD

- 2 GPIO PINS (adc, in, out)
Platypus interfaces

Two 3-Color LED displaying
- nPLC connection status
- Platypus device status
- nPLC activity

100 - 240V AC
- powers the device
- analog power amp for nPLC transceiver
- analog output filter stages to ensure CELENEC B,C compliance
- analog input filter stages for noise reduction
Platypus connects the things

IPv6 connectivity

Internet

USB2.0

nPLC

DMX lighting

RS-485

10V dimmer control
Platypus bridges the gaps

IPv6 connectivity

Internet

USB2.0

nPLC

USB2.0
Platypus stands alone

RS485 bridge

RS 485

nPLC

RS 485
Platypus hardware

High Voltage Area
• power supply
• power amplifier
• coupling transformer

Semitech SM2400 nPLC MAC
• OFDM modulation
• CSMA/CA
• encryption
• 6LoWPAN
• mesh routing
• fragmentation
Platypus hardware

Flexible Management on STM32

- ARM Cortex M3
- 64 kB embedded SRAM
- 128 kB embedded Flash
- integrated USB 2.0 PHY
- 8 MBit external NAND Flash
- external RS-485 driver
- flexible RIOT OS Based firmware

IO Connector

- USB Jack
- 0-10V DAC
- RS-485
- GPIO
Platypus compliances

- CENELEC compliant
  - B, C
- OFDM modulation compliant with G3-PLC
- adaptive differential and coherent modulations:
  - BPSK
  - QPSK
  - 8PSK
  - 16QAM

- USB 2.0
  - RNDIS USB class
  - Windows, MAC, Linux, …
- Plug & Play - IPv6 compliant router
- router advertisements, ICMPv6, …
Platypus network topology

Subnet “Orange”
fd79:db0f:5bc3:2::/64

Prefix Information
fd79:db0f:5bc3:2::/64

Prefix Information = RFC4861 section 4.6.2

Subnet “PLC”
fd79:db0f:5bc3:1::/64

SM2400 PLC Network
6LoWPAN

Subnet “Red”
fd79:db0f:5bc3:3::/64

PC chooses its own IPv6 address as “Prefix + Y”

PC chooses its own IPv6 address as “Prefix + Y”

Prefix Information
fd79:db0f:5bc3:3::/64

PC
Platypus firmware

Flexible RIOT OS based firmware

• RIOT OS HAL
• peripheral drivers
• network driver
  - Semitech SM2400 driver
  - RNDIS Ethernet driver
• IPv6 stack including
  - ICMPv6, UDP/IPv6, 6LoWPAN
• management thread
• CoAP server
RIOT OS addons

- STM32F105 Connectivity Line CPU support
- Platypus BSP
- USB Device Driver
- SM2400 Driver
- RFC 4191 Route Information support
- Driver improvements (eg. DMA for UART)
Questions?