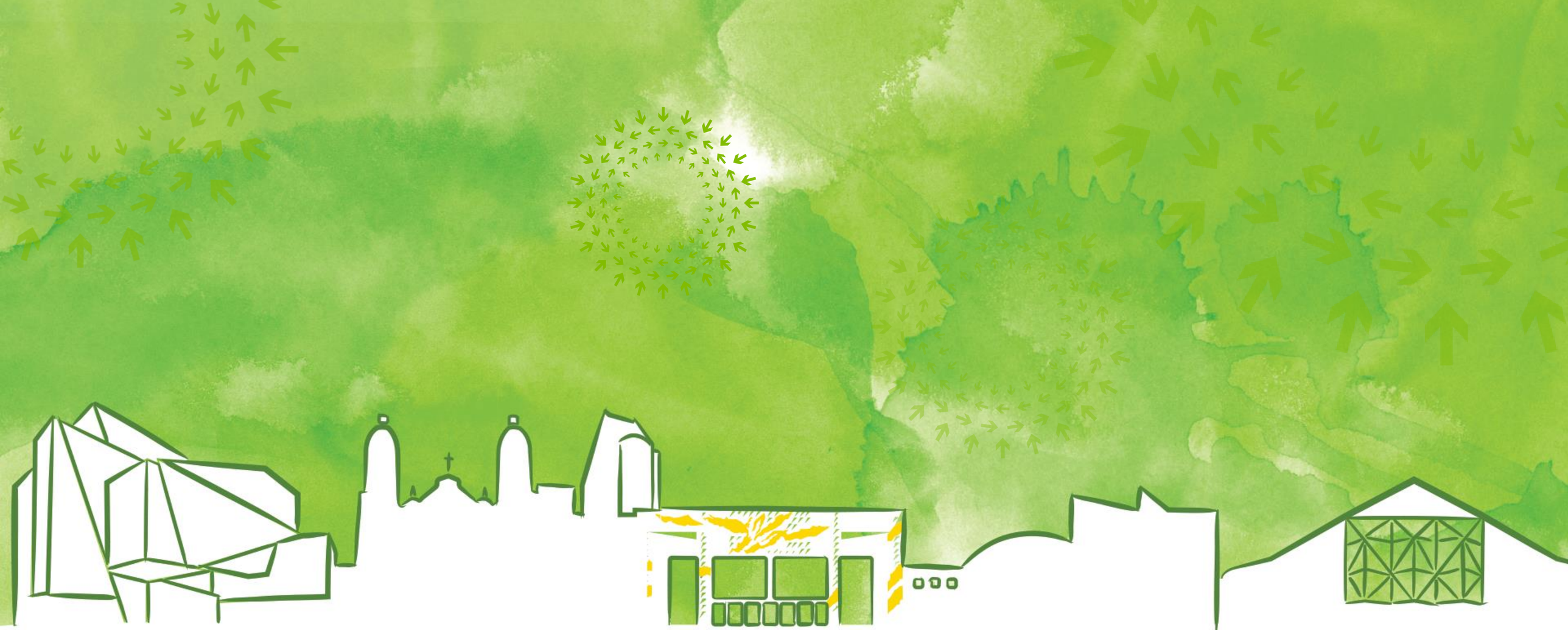

OCP U.S. SUMMIT 2016

March 9-10 | San Jose, CA

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OpenDCRE

Next-Generation Data Center Management

Andrew Cencini & Steven White
VP Engineering / Chief Architect
Vapor IO

Agenda

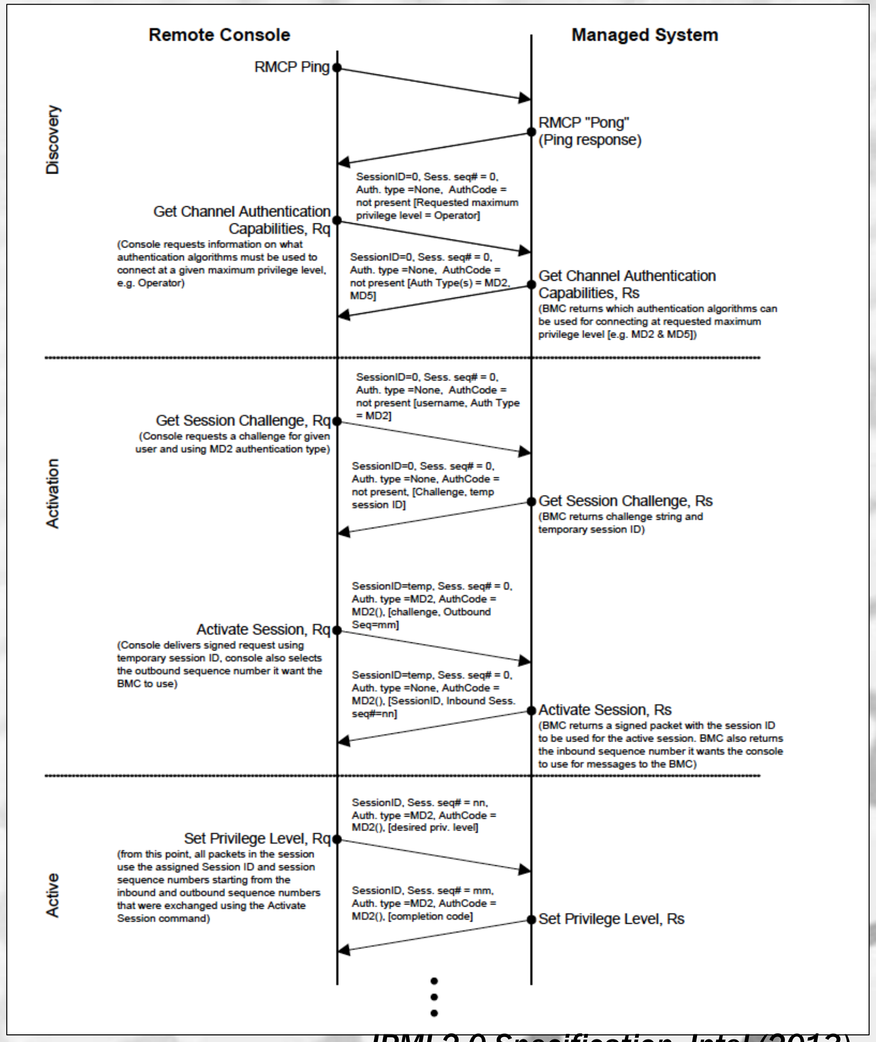
- Overview & Motivation
- Hardware
- Software
- Features
- Demo

OpenDCRE – Overview

- OpenDCRE: Open Data Center Runtime Environment.
- Combination of open-source hardware and software for out of band data center telemetry and management.
- Built by Vapor IO and contributed to the community.
- Multiple form factors and broad vendor support.
- Modern, flexible, easy-to-use.
- Uses power line and/or LAN as communications channels

OpenDCRE - Motivation

- Out-of-Band Management (IPMI) is painful
  - Legacy binary protocol (IPMI 1.0: 1998)
  - Complex and opaque (IPMI 2.0 Spec, 644 pages)
  - Varied tool support
  - Requires BMC (Baseboard Management Controller)
  - Requires OOB Switch, Cabling
- OpenDCRE is not painful!
  - Securable, GPLv2 RESTful API, hardware and Linux Distribution for data center management.
  - NO BMC, TOR Switch, Cabling (PLC Comms)



IPMI 2.0 Specification, Intel (2013)

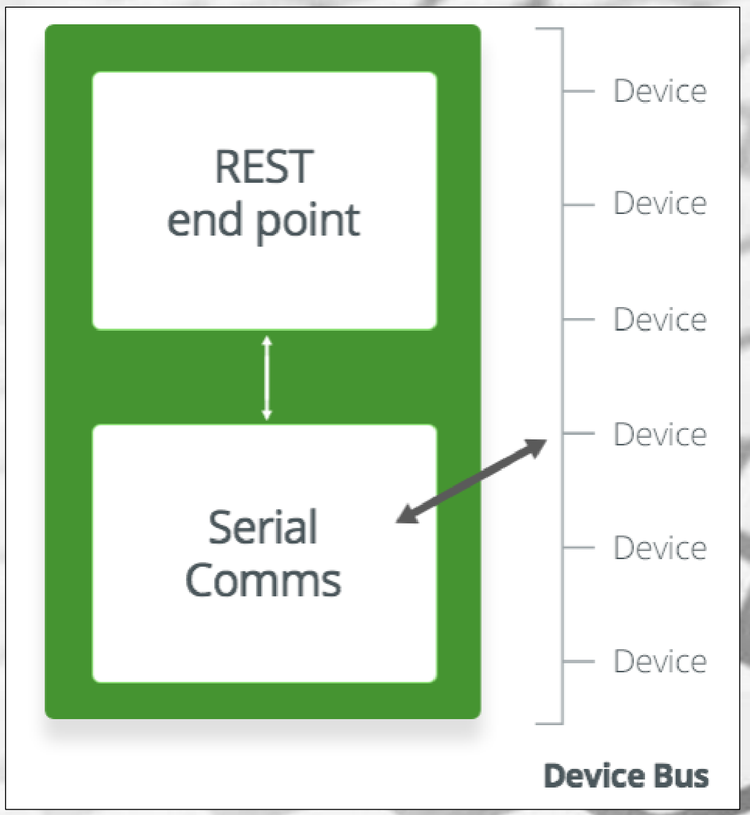
OpenDCRE - Motivation

- The world runs on REST
- DevOps tasks tend to fall into the same broad categories
  - Sensor reading
  - Power control
  - Inventory/Provisioning
- OCP OpenRack bus bar makes for great communications channel
- Related work:
  - Redfish (HP)
  - OpenBMC (Facebook)

http://i.imgur.com/o0lb2ek.jpg

OpenDCRE - Software

- OpenDCRE
  - Runs as Docker container on OpenMistOS
  - Serial Communications via GPIO to HAT
  - HAT uses PLC to communicate with device bus
  - REST Endpoint for interacting with bus:
    - Scan, read sensors, power control, etc.
    - Can drop in TLS Certs for SSL, integrate with OAuth via config as well (Nginx/uwsgi)
  - Emulator included for evaluation w/o HW
    - Configurable (JSON), automatically runs in absence of HAT
  - GPLv2, integrated into OMOS.



OpenDCRE – API/Features

- Version: Get HW/API/SW version
- Scan: Enumerate items connected to the bus
- Read: Read and interpret a given sensor or device attached to bus
  - Temperature, humidity, fan speed, power consumption
- Power: Turn power on, off, cycle, and get status
  - Voltage, current, on/off, over/under voltage/current
- Asset: Asset and hardware information
- Boot Target: Set/get boot target for PXE/HDD boot for provisioning, etc.
- LED: Toggle chassis LED for visual location/verification, remote service
- Fan: Control fan speed

OpenDCRE REST API Examples

- https://host:port/opendcre/1.2/power/1/1[/{on|off|cycle|shutdown|status}]
- https://host:port/opendcre/1.2/read/thermistor/1/2
- https://host:port/opendcre/1.2/asset/1/5
- https://host:port/opendcre/1.2/led/1/7[/{on|off}]
- https://host:port/opendcre/1.2/fan_speed[/speed_rpm]

OpenDCRE – The Gateway Drug…

OpenDCRE v1.2 – IPMI 1.5/2.0 Support

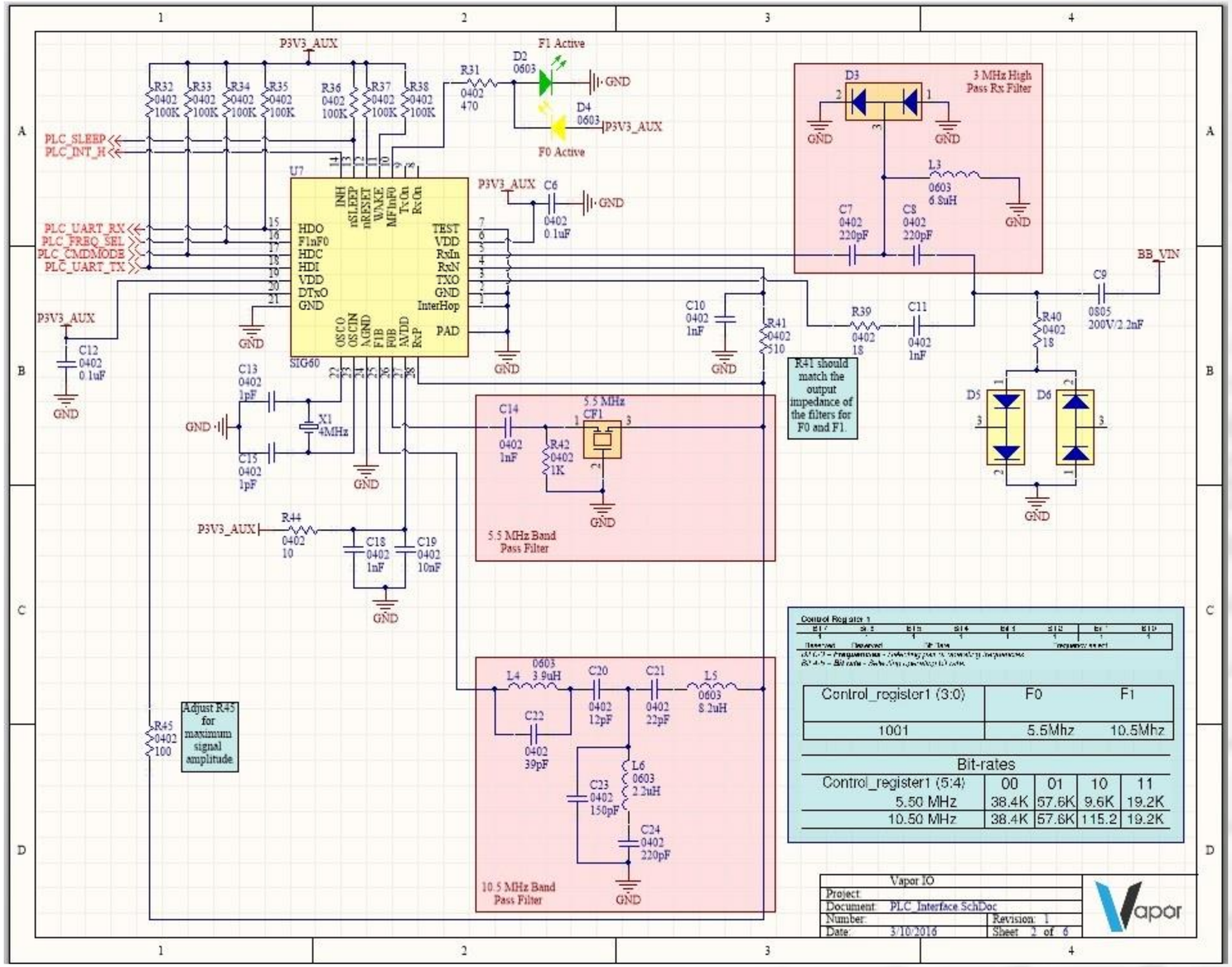
- All features of OpenDCRE
- Auth: None, Password, MD2, MD5, RAKP_HMAC_SHA1
- Integrity: None, HMAC_SHA1_96
- Encryption: None, AES_CBC_128
- Virtually unlimited #BMCs from single OpenDCRE endpoint

- Redfish & OpenBMC support coming soon

http://sr.photos3.fotosearch.com/bthumb/CSP/CSP991/k12456743.jpg

OpenDCRE - Hardware

- Raspberry Pi 2 Model B
- OpenDCRE HAT Board
- Power-Line Communications (PLC)
- Sensors/Devices
  - Temperature (thermistor)
  - Power Control (OCP)
  - Other hardware – fans, LED, etc.
- Open-Source HW (OCP)

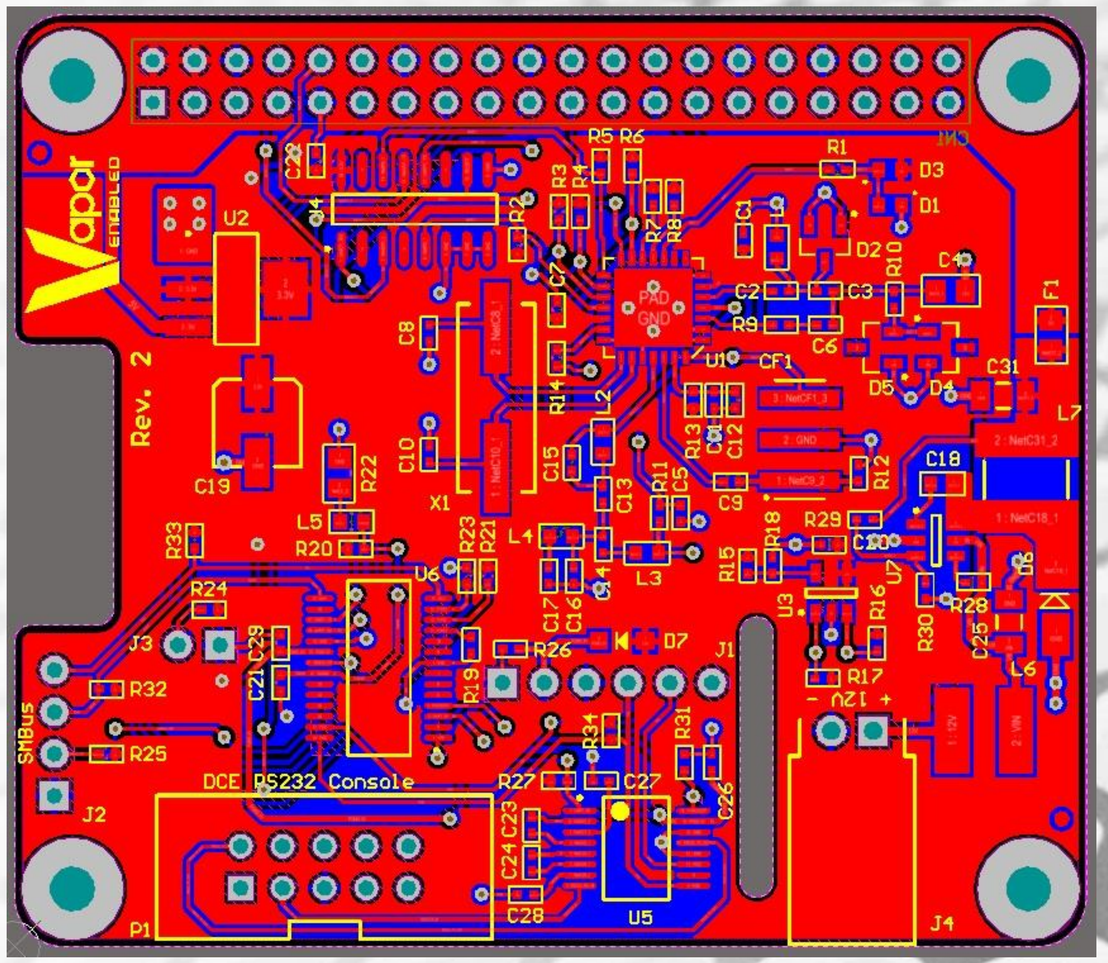


Power Line Communications

- Based on Yamar SIG60
- Tightly integrated design
- Two frequency choices
- Optimized for noisy 12VDC automotive environments
- Simple control through a UART connection with 4 additional GPIO
- Low power with sleep capability

PCB Layout

- Pi HAT (**H**ardware **A**ttached on **T**op) compliant form factor
- EEPROM for identification and auto-configuration in the operating system
- Simple 2 layer layout
- Only top side components
- Connections for RS232 and SMBus
- Switching between PLC and onboard microcontroller for firmware development
- Powered completely from 12VDC



OpenDCRE - Demo

Future

- OpenDCRE 1.2 Release – March 10, 2016
- Community contributions – additional device types, sensors, etc.
- Additional form factors to be announced
- OpenMistOS for Raspberry Pi – wheezy to jessie migration.
- Docker-compose support.
- Additional integrations (OpenStack, etc.).
- Further support for 19” environments, Redfish, OpenBMC.
- GitHub: https://github.com/vapor-ware/opendcre

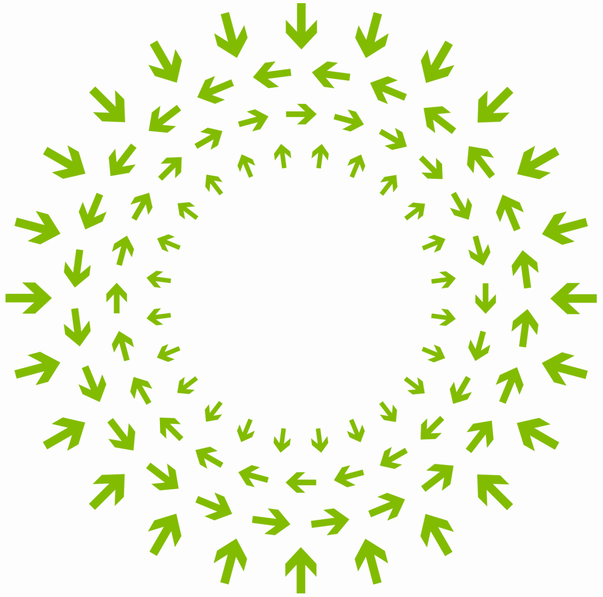
Thank You

- Questions?

- Contact:
  - Andrew Cencini
  - andrew@vapor.io

  - Steven White
  - steven@vapor.io

Thank You



OPEN

Compute Project