



**ONE CONNECTION**  
INFINITE WAYS TO CONNECT

**Bill Lempesis**  
**Executive Director**  
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# Agenda

- VESA Overview
- Why DisplayPort?
- DisplayPort Standards
- DisplayPort™ over USB-C™
- DisplayPort Future

# Example of VESA Members



# About VESA

- VESA is the **Video Electronics Standards Association**
- Global industry alliance with more than **230 member companies**
- Develops **Open** standards, contribution is open to all companies at all stages of development

# Why DisplayPort?

- Low voltage, AC coupled interface compatible with sub-micron process geometry, simplifying integration
- Data scrambling and fixed link rates simplify EMI and RFI mitigation
- Scalable to resolutions of 8K and beyond
- Multi-Stream mode enables support of multiple monitors
- Support of protocol converters to VGA, DVI, or HDMI
- Support of high-definition audio formats per CEA 861

# Latest DisplayPort Standard

- The VESA DisplayPort Standard, Version 1.3, was released on September 2014
- Main New Features for DP 1.3
  - Up to 8.1 Gbps per lane, 25.92 Gbps usable
    - 5K x 3K (24bpp, 60Hz, 4:4:4)
    - 8K x 4K (24bpp, 60Hz, 4:2:0)
    - 4K x 2K (30bpp, 60Hz, 4:4:4)
  - Further optimized for use on shared interfaces including DisplayPort over USB-C
  - “Living Room Friendly” features added to enhance applicability for consumer displays including digital televisions

# DisplayPort over USB-C Overview

## DisplayPort over USB-C

The most advanced display connection now uses the most versatile connector.

[Learn More](#)



# VESA DisplayPort Over USB-C Summary

- The *VESA DisplayPort Alt Mode Standard* was released on Sept 22, 2014
- Developed in liaison with the USB Implementers Forum
- Enables the use of DisplayPort over the USB Type-C interface

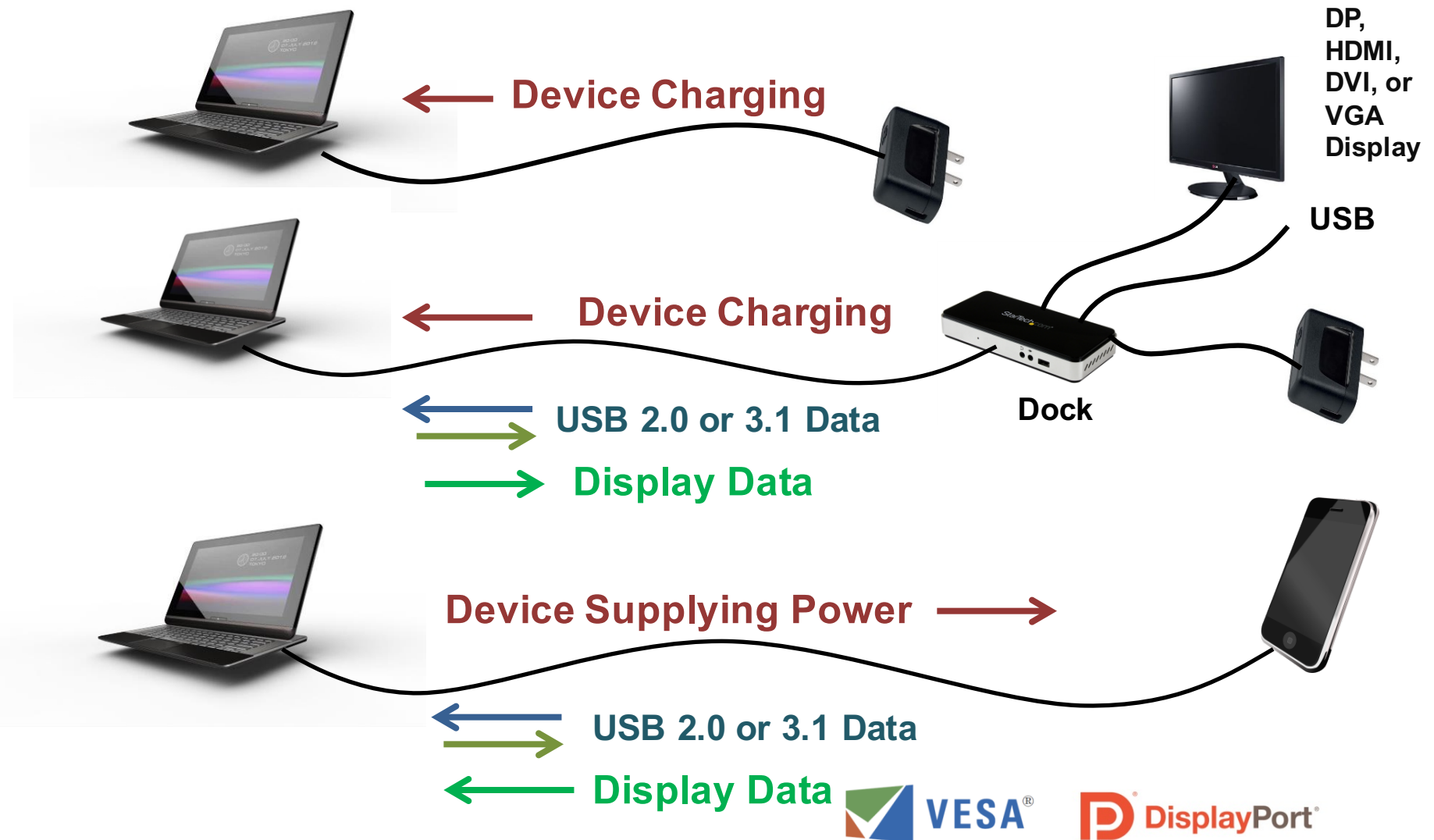


# DisplayPort over USB-C

- Initial product designs all use DisplayPort over USB-C
  - Apple MacBook
  - Google Chromebook Pixel
  - More coming soon
- Why?
  - Close collaboration in PC industry
  - Well suited to co-exist with USB on the same interface
    - Similar electrical and protocol characteristics
      - Low voltage, AC-coupled Packetized Data Structure
  - Allows the use of common system elements:
    - Interface chip PHY design, cable and connectors, switching circuits
    - Similar EMI/RFI considerations

# Example USB Type-C Configurations

Either end can serve as USB Host, USB-PD Power Consumer, and DisplayPort Video Source (these services are independent of each other)



# Supports Other Display Interfaces Using USB-C

- DisplayPort over USB-C video adapters and adapter cables are available to support other display types
- Packetized data allows for other interface types

DP over USB-C to HDMI 2.0a



DP over USB-C to VGA



DP over USB-C to DVI



# DisplayPort Future

- DisplayPort 1.4 due for release in Q4 2015
  - Adds VESA Display Stream Compression (DSC) with Forward Error Correction (FEC)
  - Audio extensions per CEA 861-F, CEA 861.2
  - HDR Metadata (support for all including SMPTE ST 2092, CEA 861.3 and Dolby)
  - Improved MST functionality
  - Adaptive Sync
  - 8K, HDR 30bpp, 120Hz, 4:2:0

# ONE CONNECTION

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[www.displayport.org](http://www.displayport.org)

[www.vesa.org](http://www.vesa.org)

