

CONNECTING AT THE SPEED OF LIGHT

Acacia's Role in Open Optical Networks

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We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. The forward-looking statements contained in this presentation reflect our current views with respect to future events, and we assume no obligation to update any forward-looking statements.

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Outline

- What is an Open Optical Network? A component vendor's perspective
- Coherent optical component trends to enhance the open optical network experience
 - Industry standardization
 - Smaller form factors
 - Transmission-centric optimization
- Enabling system platforms to differentiate--end user has more choices

Acacia's Network Vision

- Provide coherent technology with industry leading performance and low power consumption
- Support multi-vendor interoperability via industry standards groups such as Open ROADM, OIF, ITU, IEEE, TIP, CableLabs, etc.



On-board Modules



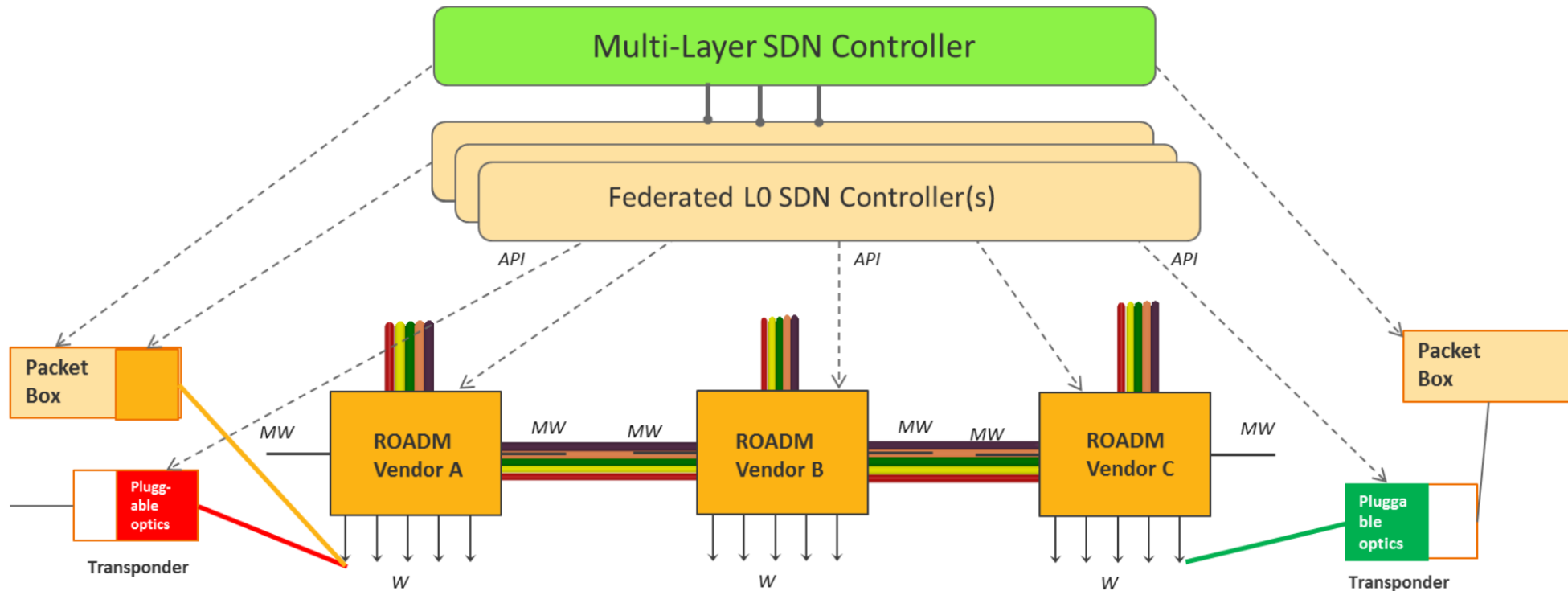
Pluggable Modules



Coherent Components

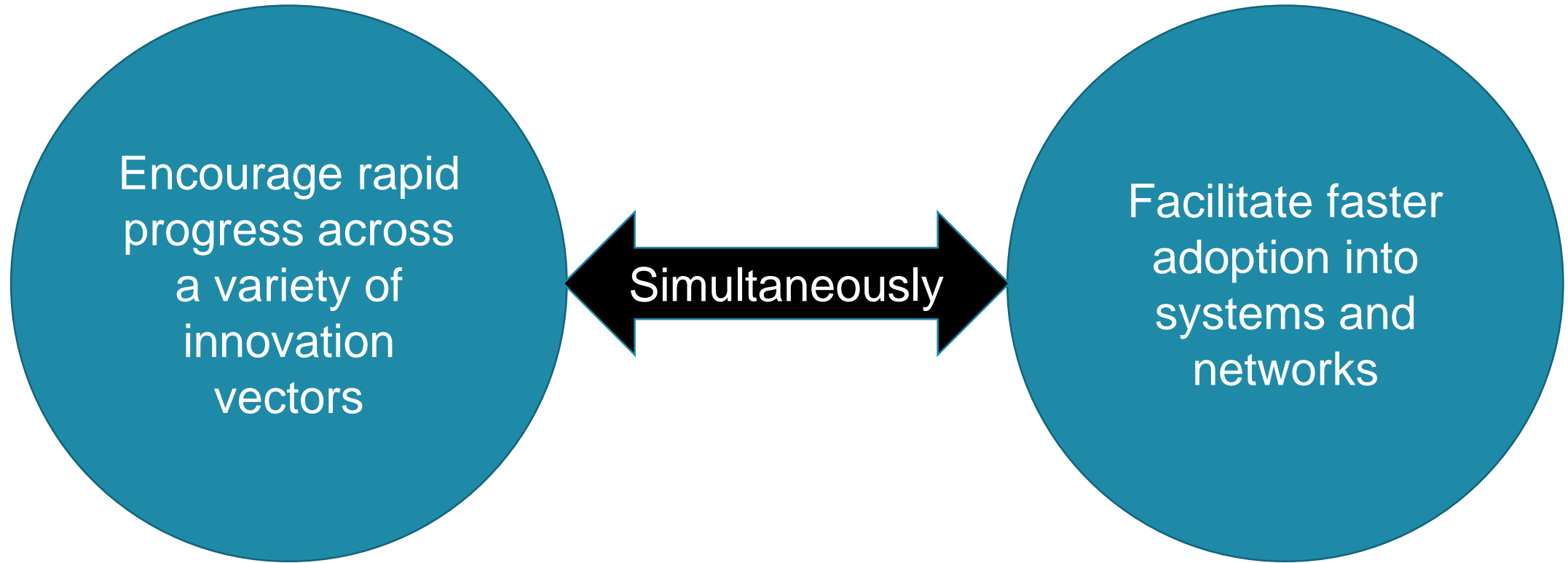
What is an open optical network?

- From Open ROADM white paper:



-Open ROADM whitepaper v1-0.pdf, openroadm.org Multi-Source Agreement, <http://openroadm.org/download.html>

Why build an open optical network



Now you'll hear our transponder sub-system view on how this will work

Transponders are key to network innovation

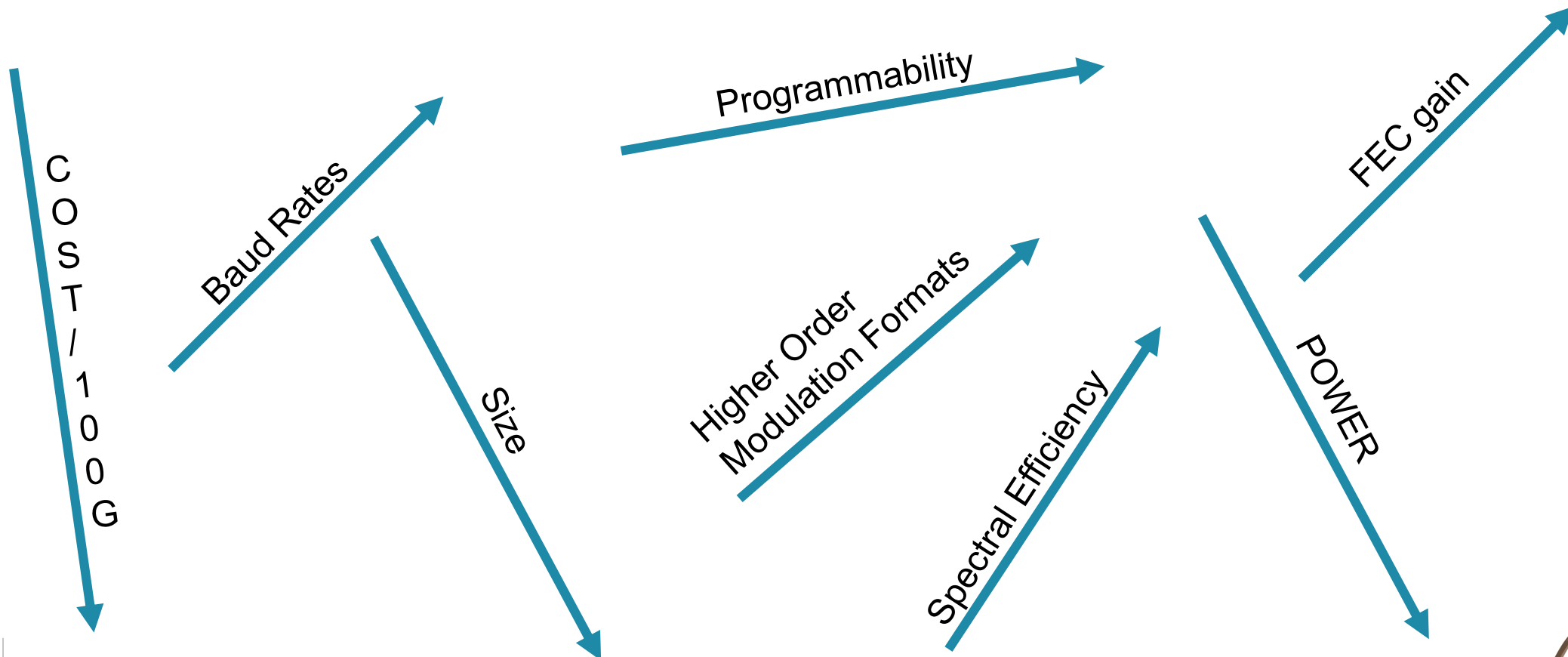
- In the last 10 years, approximately...
 - 25X greater capacity per fiber
 - 40X more bits per rack
 - 20X less power per bit
 - 60X more capacity across the Pacific

Transponders drive key elements of innovation in the optical network to drive these improvements

Innovation vectors for optical

Coherent transponders have complex hardware with increasing feature-sets

- Desire to allow users to customize software to take advantage of these advances



Laser Focus on Coherent Technology Innovation



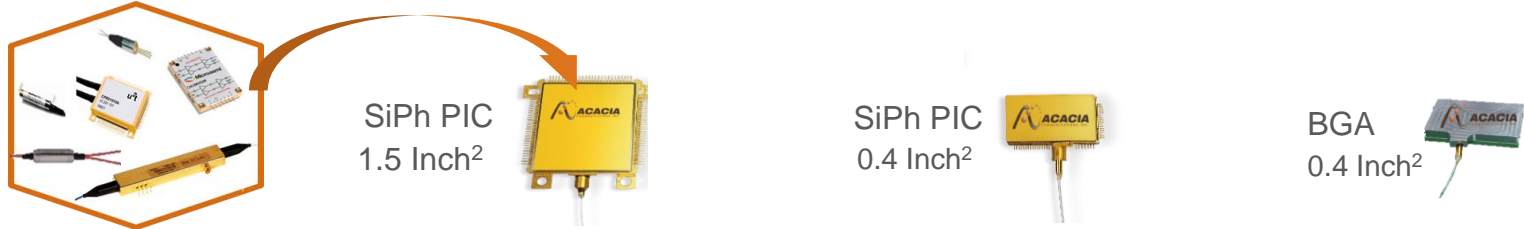
Modules



DSP ASICs



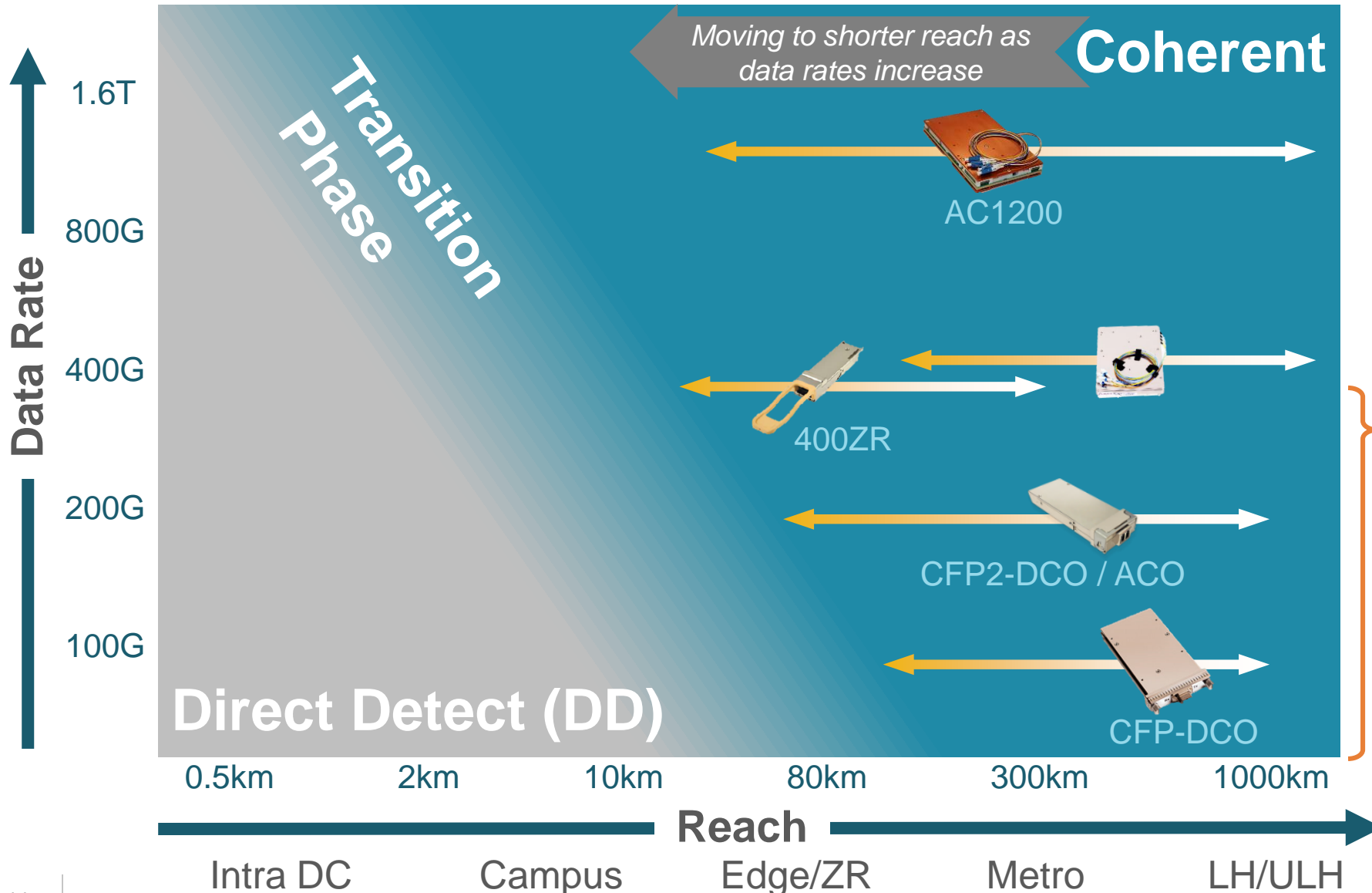
Silicon PICs



We believe rapid component design cycles allow innovations to reach market quicker and enables system vendors to focus on higher-layer innovations

Industry Standardization

Coherent Technology Trends – DCO and Shorter Reaches



Edge applications driving transition towards shorter reach coherent solutions & industry standardization

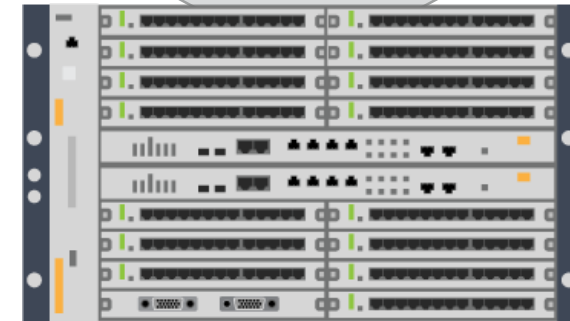
- Industry Momentum for Pluggable DCO Driven by Edge and Access**
- OIF
 - Targets 400G client form factors
 - IEEE
 - 100G, 200G, & 400G beyond 10km reach
 - CableLabs
 - Coherent Access Standard

Smaller Form Factors

Pluggable CFP2-DCO Modules

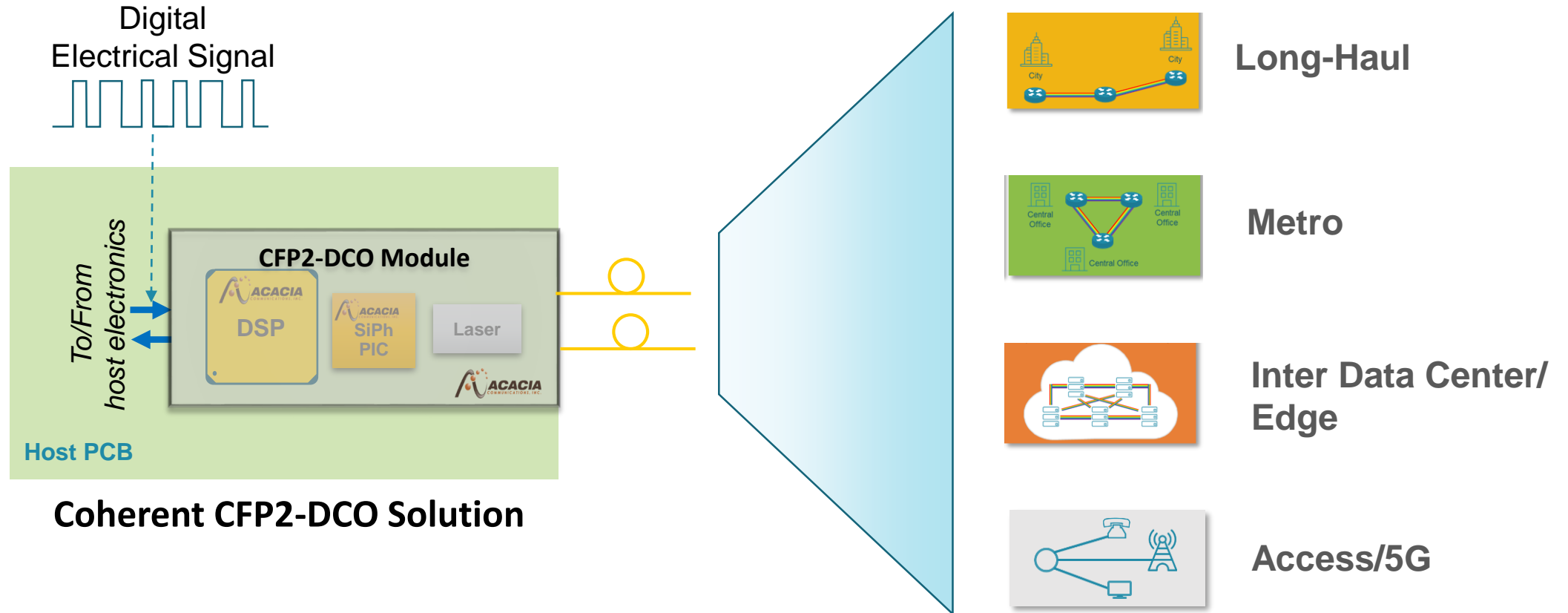
Size, Savings, Simplicity, Standardization, and Serviceability

- High face-plate density--Up to 1.6Tbps (8 modules x200G) capacity per linecard
- Pay as you grow model
- Same host interface as client modules
- CFP2-DCO form factor serving as baseline for coherent standardization at 100/200/300/400G.
- Hot-pluggable--replace modules without disrupting traffic on the rest of the card



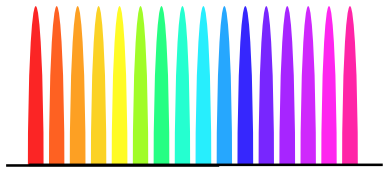
CFP2 form-factor enables high-density coherent transmission via client ports

CFP2-DCO—A Solution Serving Multiple Network Applications

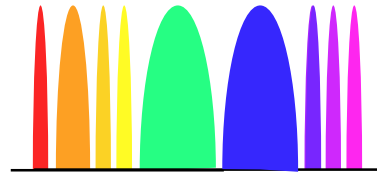


Transmission-Centric Optimization

Fixed to Adaptable Evolution—The Next Wave of Transmission Shaping

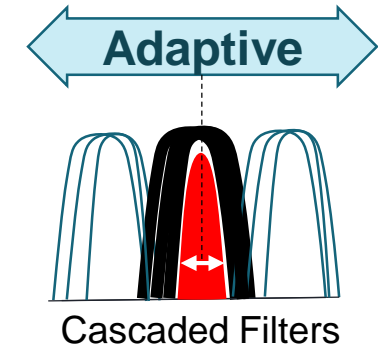


DWDM Standards
Fixed grid Tx-to-Rx
Fixed grid line system filters



WSS technology
enables flex grid line systems
Super-channels Tx-to-Rx
Coherent quantized spectrum
(e.g., QPSK/8QAM/16QAM)

Adapting the Network to the
Transmission

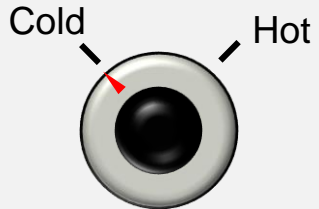


Coherent Shaping
Technology enables
spectral optimization to
channel passband

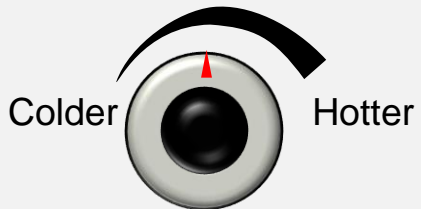
Adapting the *Transmission* to
the Network

Full Adaptability Turns Excess Margin into Usable Bandwidth

Thermostat Analogy



Fixed Choices
Compromise comfort
VS.

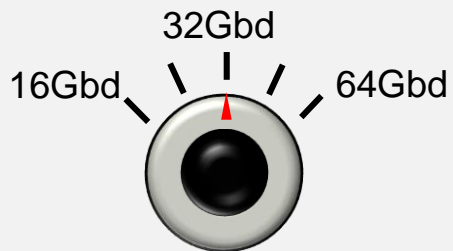


Variable Settings
Maximize comfort

Coherent Transmission

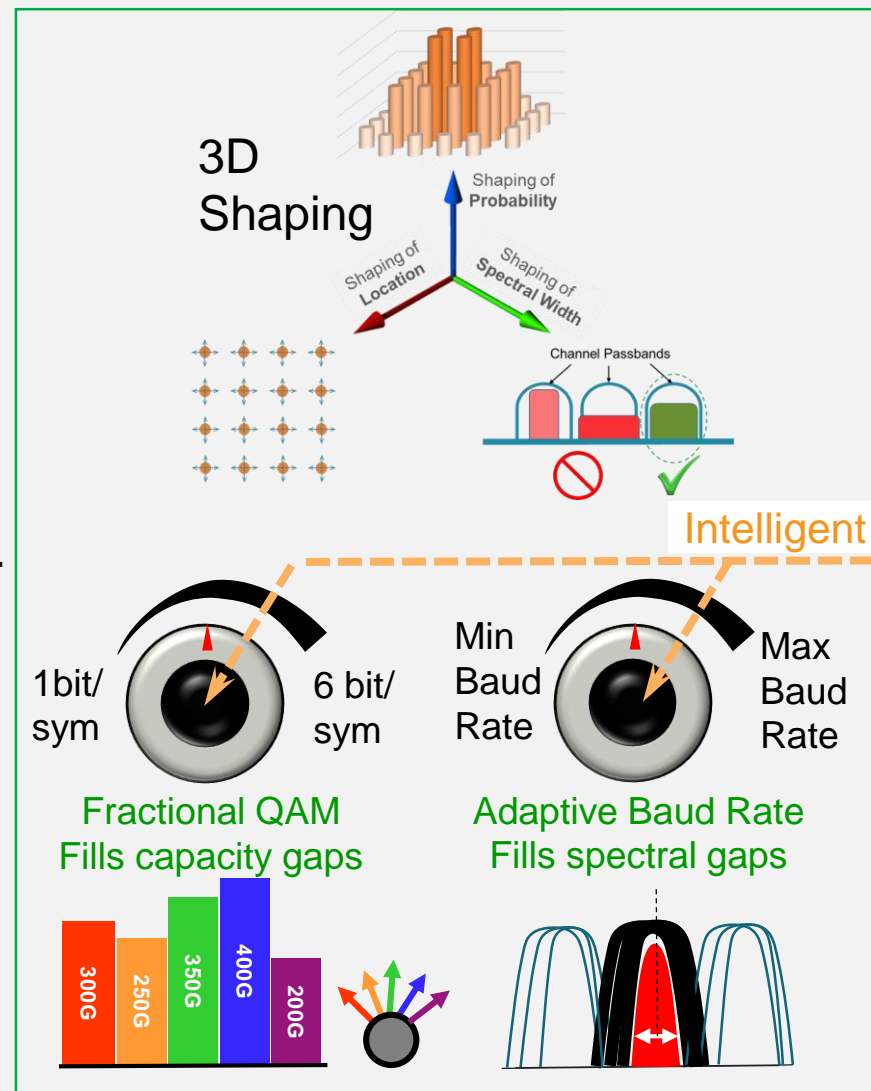


Quantized QAM Settings
Create capacity gaps



Fixed Baud Rates
Create spectral gaps

VS.



Full adaptive control of transmission

+



intelligent control

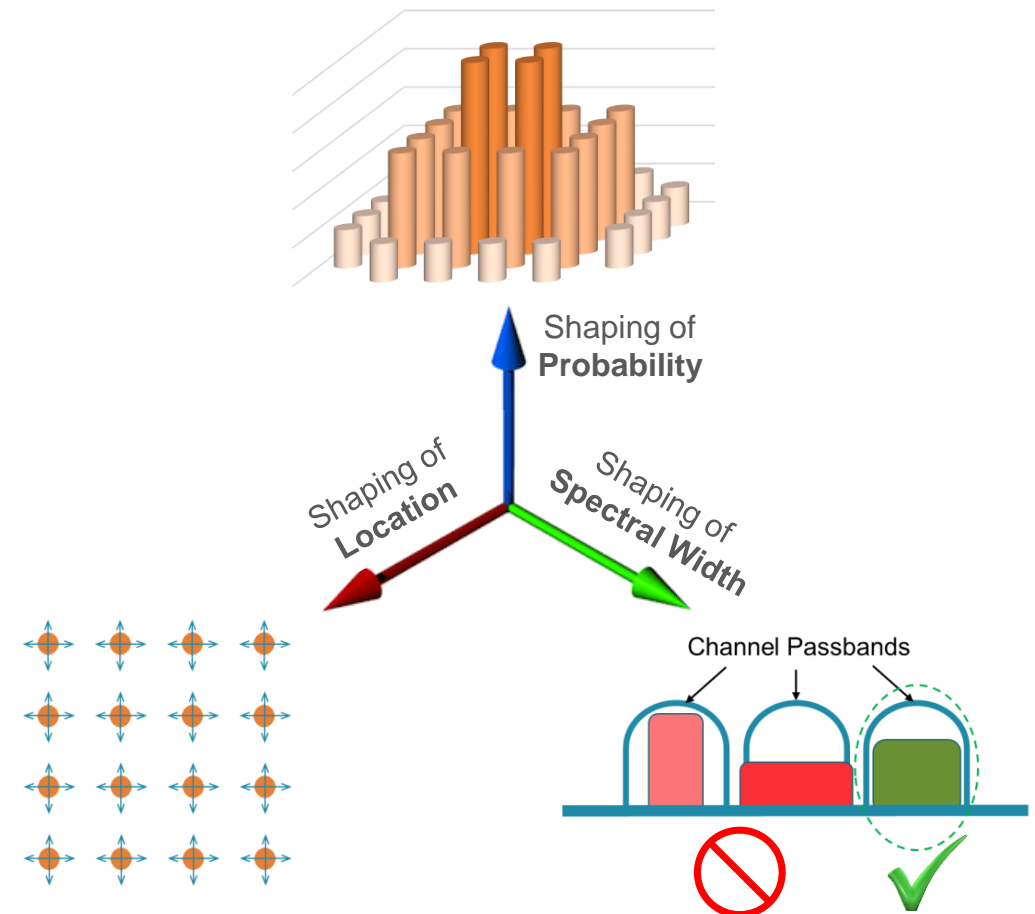
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Fully optimized transmission

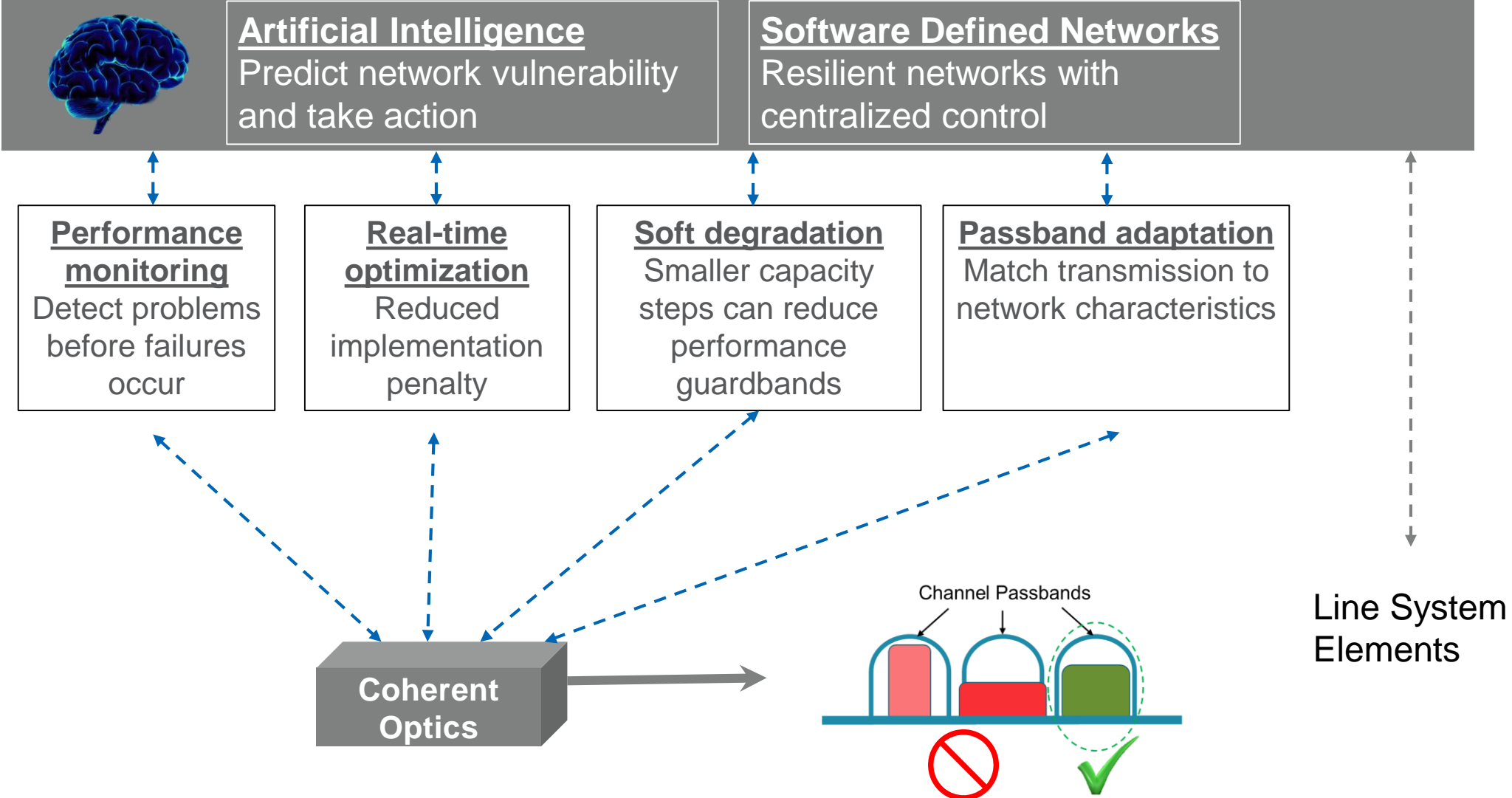
Optimize Network Utilization with 3D Shaping

- **3D-shaping** with minimal increase in power consumption
 - Shaping of the constellation points' **probability** to optimize **capacity** using Acacia's patented Fractional QAM modulation
 - Shaping of the constellation points' **location** to optimize **reach**
 - Shaping of the **spectral width** to match the available channel **passband** by adapting the baud rate
- **Enhanced SD-FEC** with configurable overhead and FEC iterations

Maximum capacity for any network:
any distance, any passband



Enabling Intelligent Transmission



Summary

- Acacia provides a merchant option for high performance coherent optical technologies to a broad customer base
- We believe this increases competition and innovation
- Open networking allows operators to select equipment that offers the best match for their specific requirements
- Open networking gives end users more control over their network and deployment scenarios

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