CENIC-AIR and the Science DMZ Model
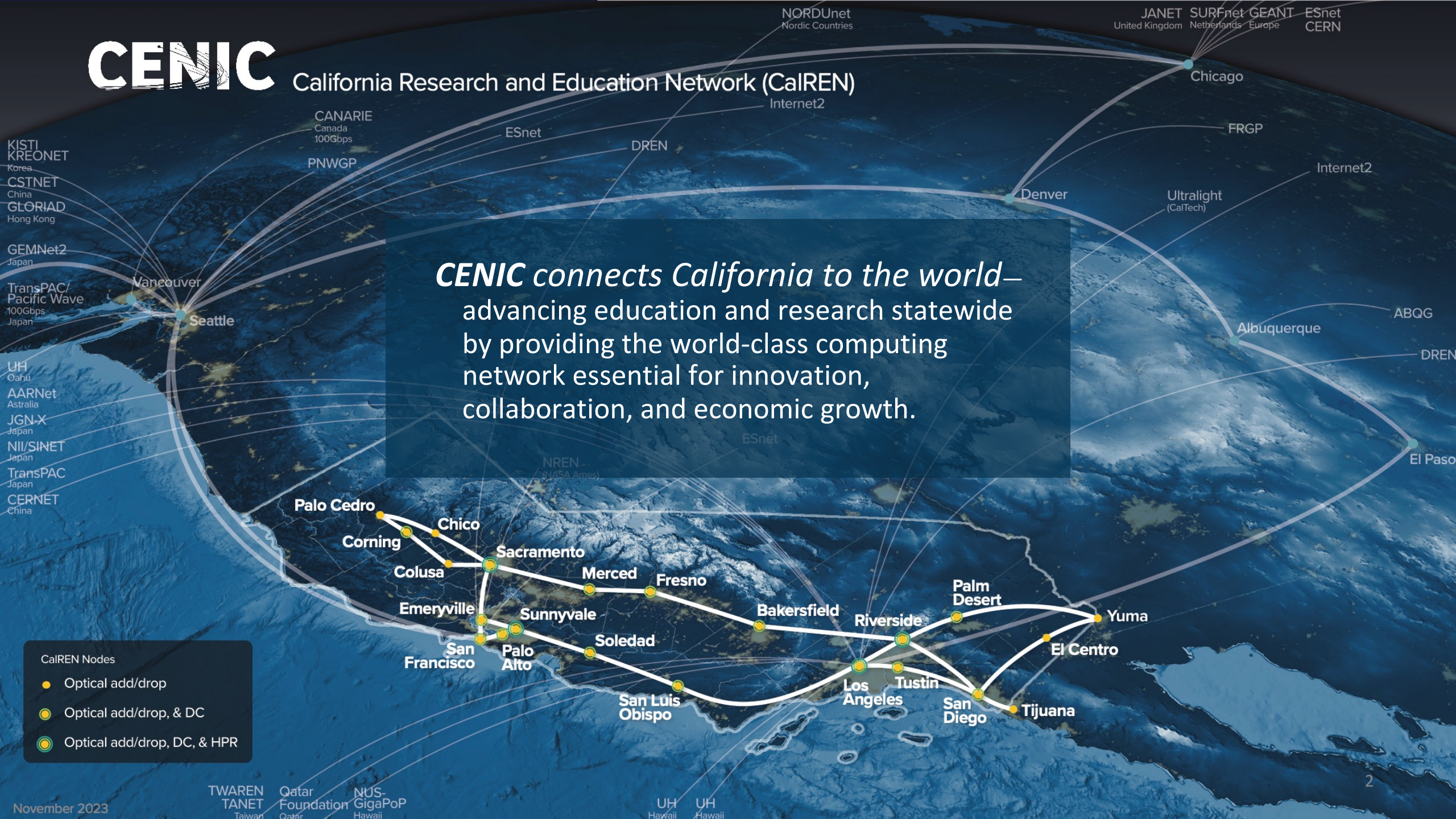
Fifth National Research Platform (5NRP) Workshop
March 22, 2024

Christopher Bruton
Robert Kwon
Tom DeFanti

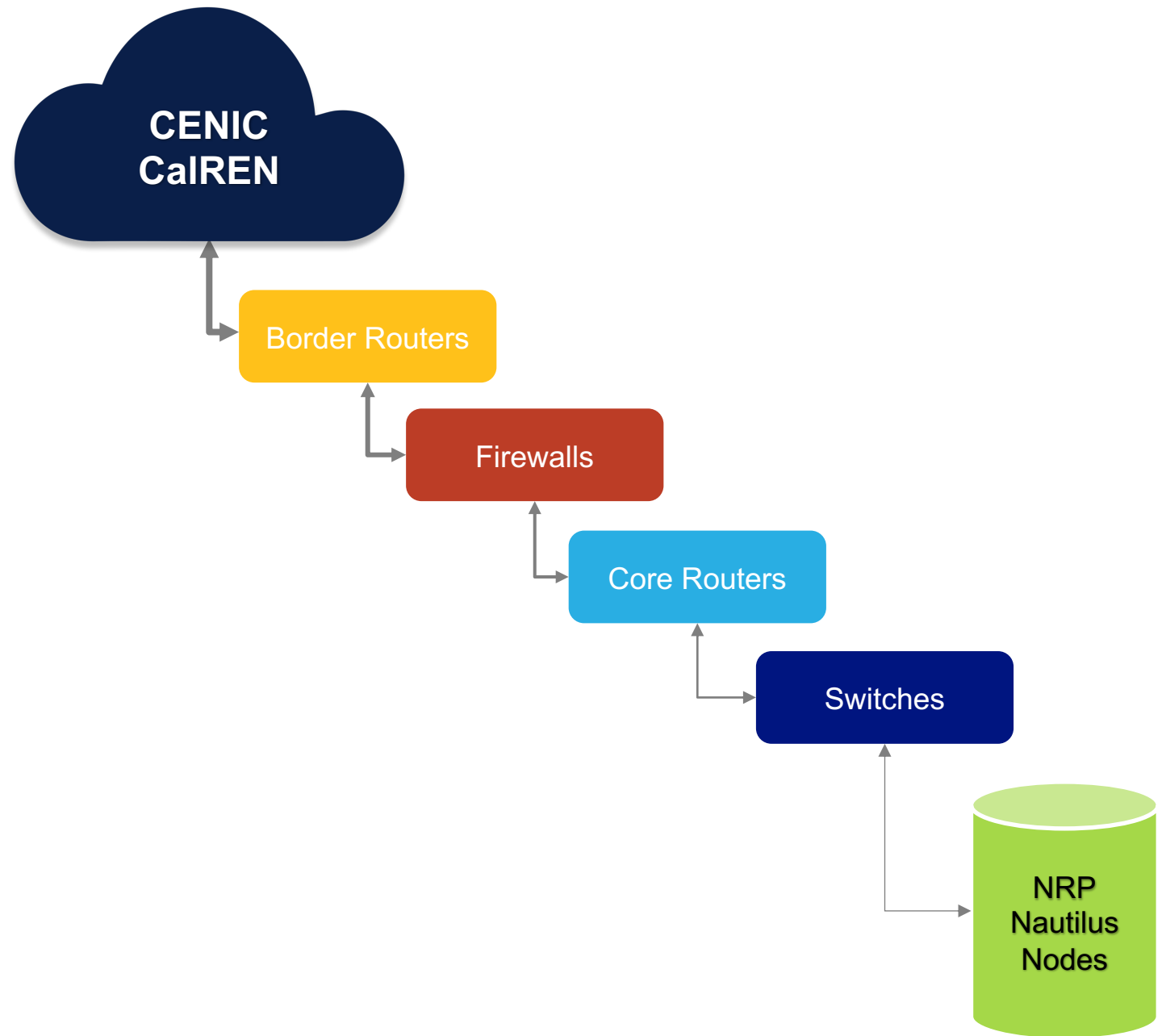CENIC AIR
CENIC ARTIFICIAL INTELLIGENCE RESOURCE

The Problem

Campus enterprise networks are not always suitable for high-performance computing.

CENIC CalREN
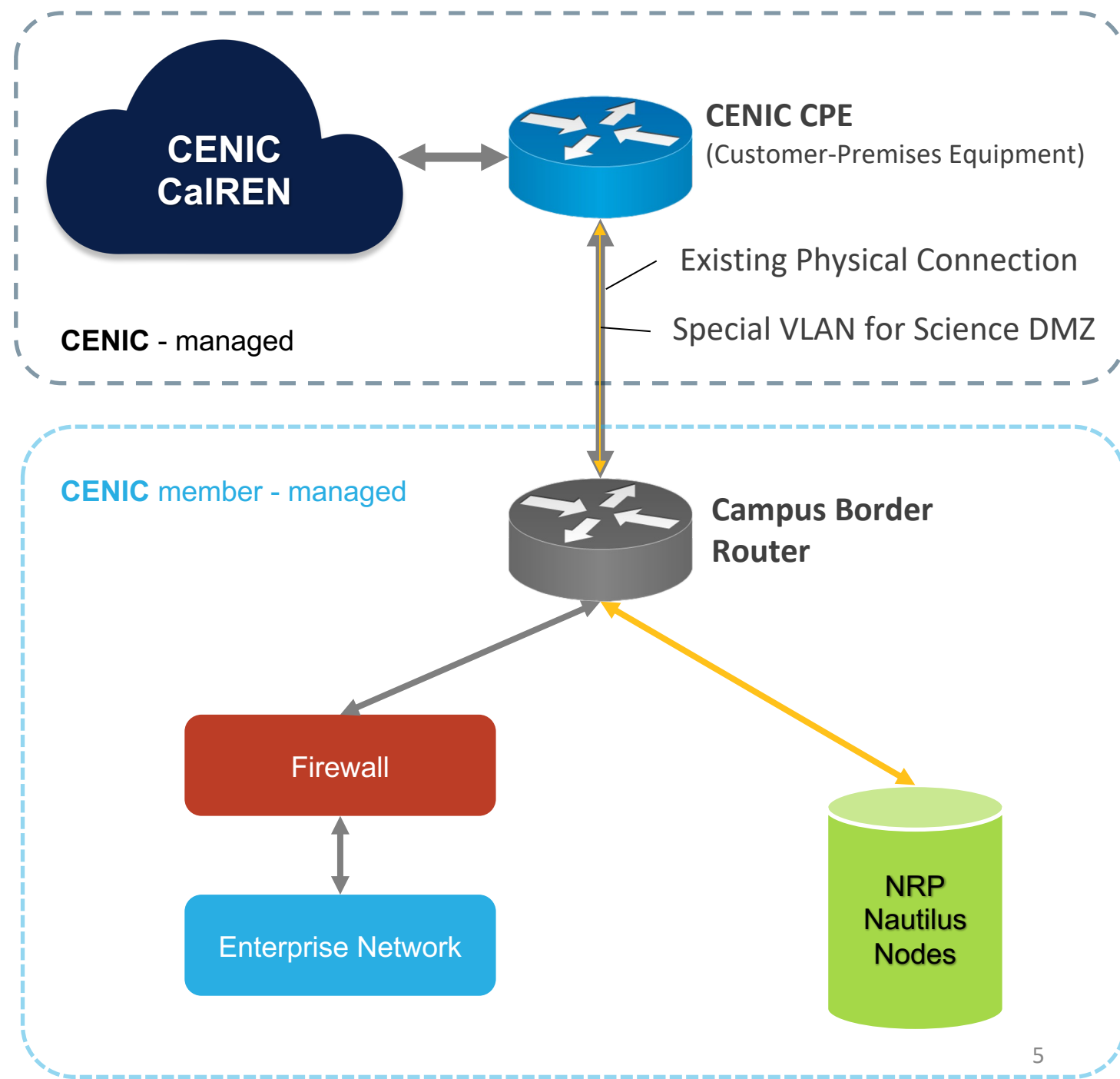
Border Routers

Firewalls

Core Routers

Switches

NRP Nautilus Nodes

Solution:
The Science DMZ Model

Dedicated high-throughput, low-latency network access for research computing.

CENIC CalREN

Border Routers

Firewalls

Core Routers

Switches

NRP Nautilus Nodes
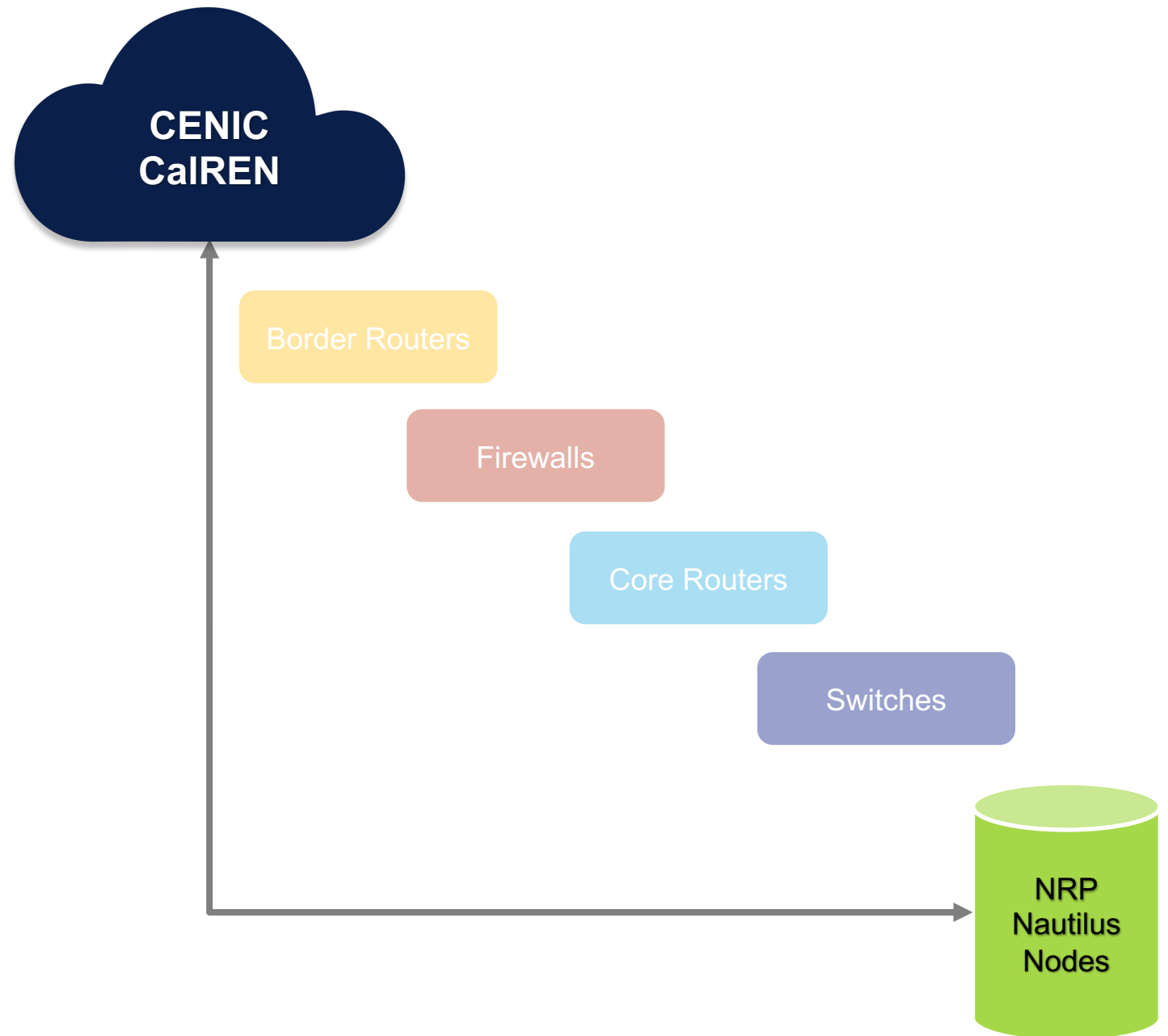
CENIC Option 1: Virtual Science DMZ

❖ Logical subinterface (VLAN) on an existing CENIC connection.

❖ Lower cost and faster delivery than a new physical connection.

❖ Campus must handle their own routing and switching.

CENIC CaIREN

CENIC CPE
(Customer-Premises Equipment)

Existing Physical Connection

Special VLAN for Science DMZ

CENIC - managed

CENIC member - managed

Campus Border Router

Firewall

Enterprise Network

NRP Nautilus Nodes

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CENIC Option 2a: Physical Science DMZ

❖ Additional physical handoff at the CPE.

❖ Dedicated bandwidth to the CPE—but total CalREN capacity is still shared.

❖ Potentially higher cost and longer lead time than Option 1.

❖ Campus must handle their own routing and switching.

CENIC CalREN

CENIC CPE
(Customer-Premises Equipment)

Existing Physical Connection

New Science DMZ Connection

CENIC - managed

CENIC member - managed

Campus Border Router

Firewall

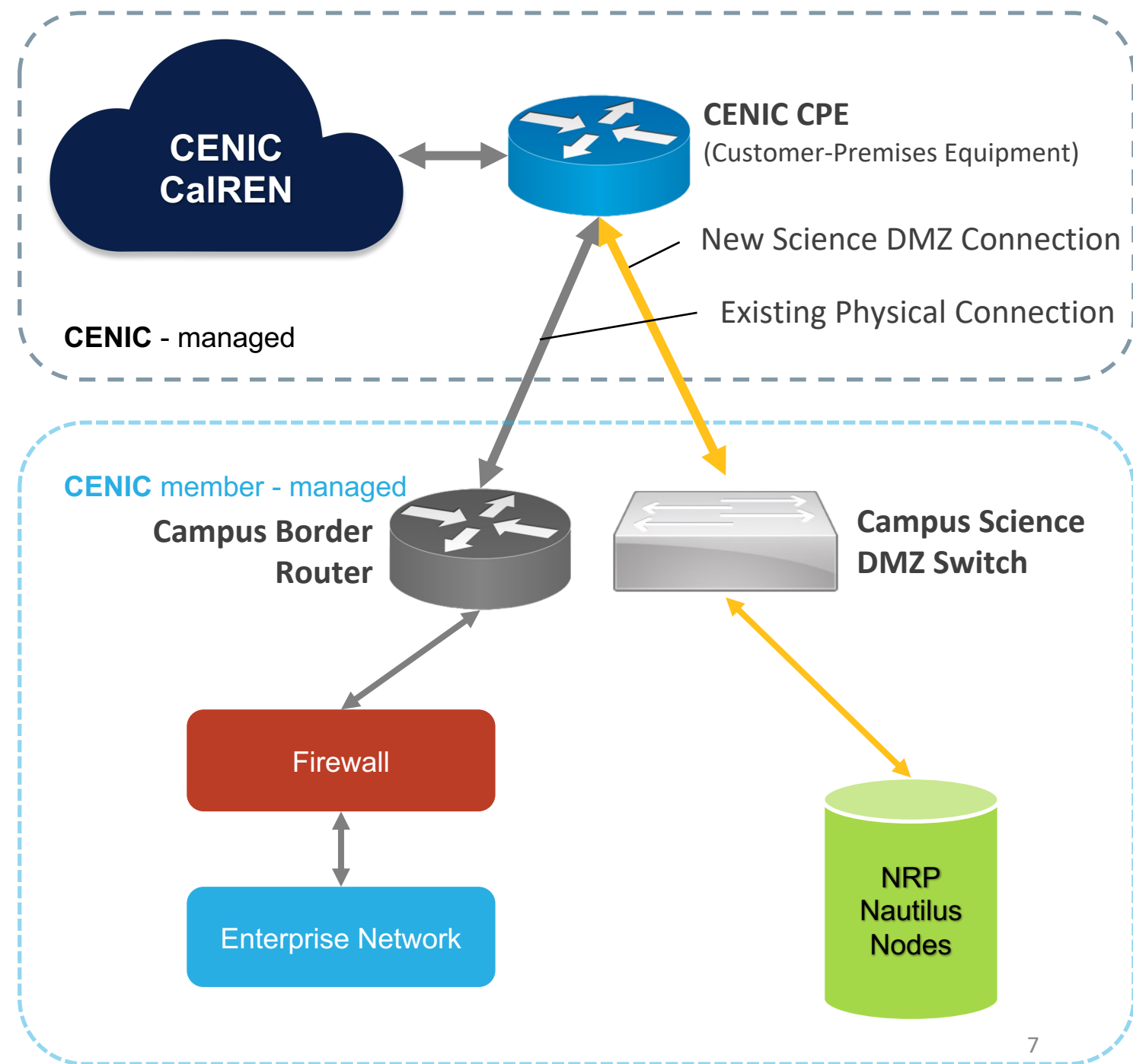Enterprise Network

NRP Nautilus Nodes

6
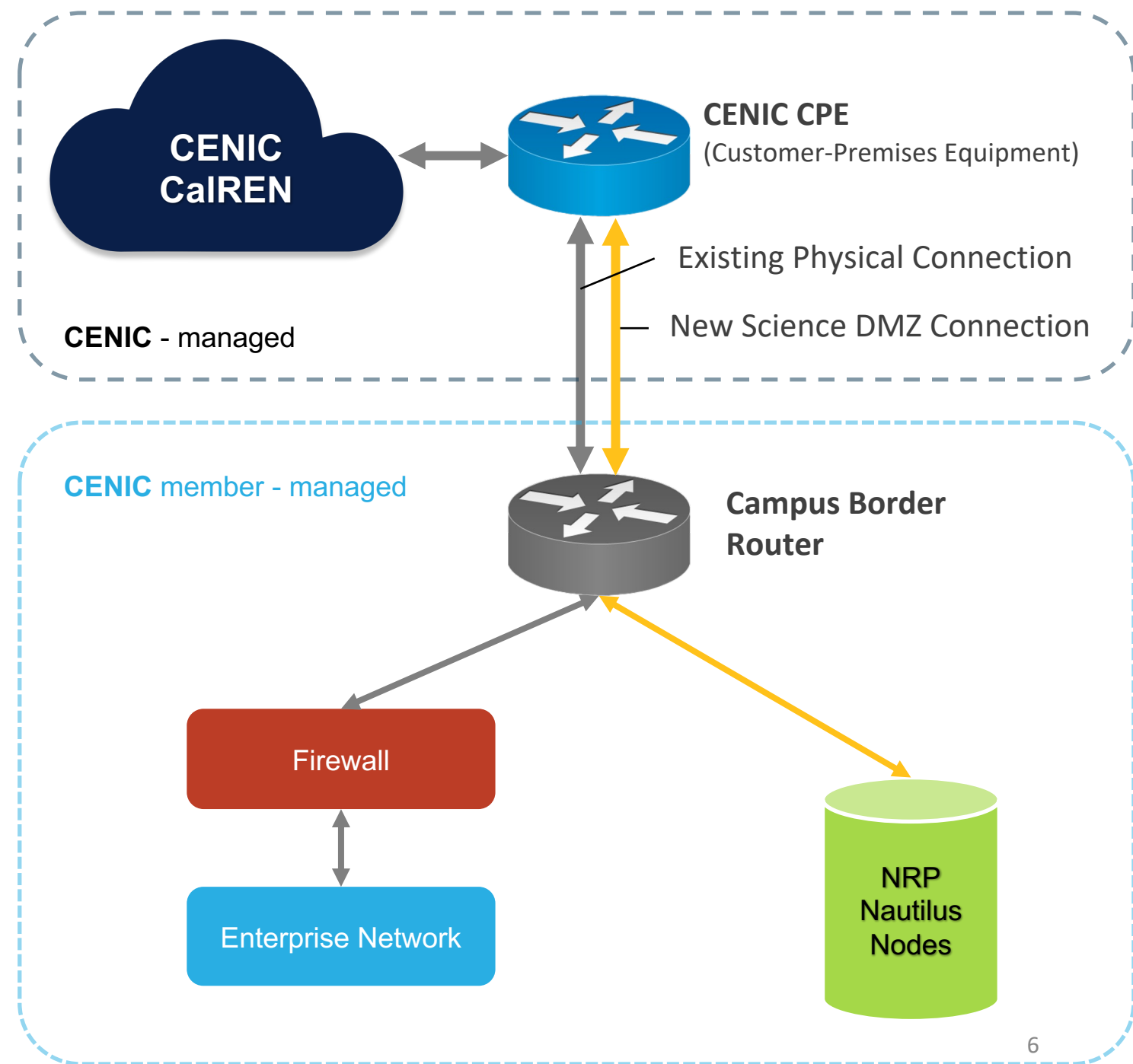
CENIC Option 2b: Physical Science DMZ

- ❖ Additional physical handoff at the CPE.

- ❖ Dedicated bandwidth to the CPE—but total CalREN capacity is still shared.

- ❖ Potentially higher cost and longer lead time than Option 1.

- ❖ Campus must handle their own routing and switching.

CENIC CaIREN

CENIC CPE
(Customer-Premises Equipment)

New Science DMZ Connection

Existing Physical Connection

CENIC - managed

CENIC member - managed

Campus Border Router

Campus Science DMZ Switch

Firewall

Enterprise Network

NRP Nautilus Nodes

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Interlude: Introducing CENIC-AIR

CENIC AI Resource—the California portion of the National Research Platform (NRP)

CENICAIR
CENIC ARTIFICIAL INTELLIGENCE RESOURCE

"We are excited to see NRP usage rapidly expanding from the original 25 research universities comprising the Pacific Research Platform (PRP). **The California subset of the NRP, the *CENIC AI Resource (CENIC-AIR), * is available for use by all CENIC member institutions for both research and education purposes.**"
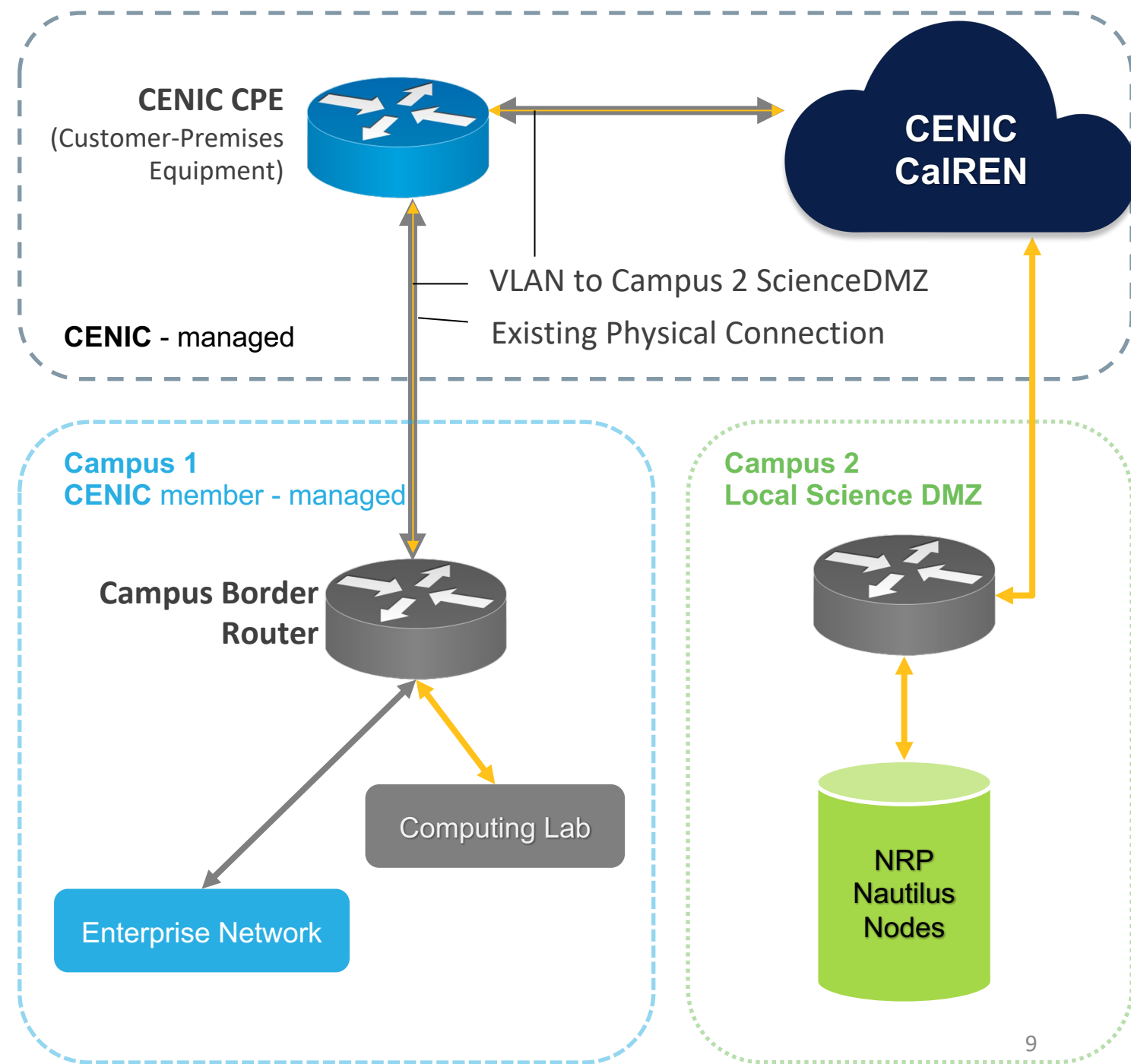
—Larry Smarr,
Professor emeritus at UC San Diego

"Artificial Intelligence/Machine Learning is primarily an experiential science–one learns by doing–and CENIC-AIR is a great launching pad for faculty and students all over California. Just as SDSU is doing, **CENIC-connected campuses can also host on-premises compute and data nodes that become part of CENIC-AIR**, taking advantage of the **NRP's node administration** and *CENIC's advanced network services and expertise.*"

—Tom DeFanti
Principal investigator at UC San Diego and CENIC
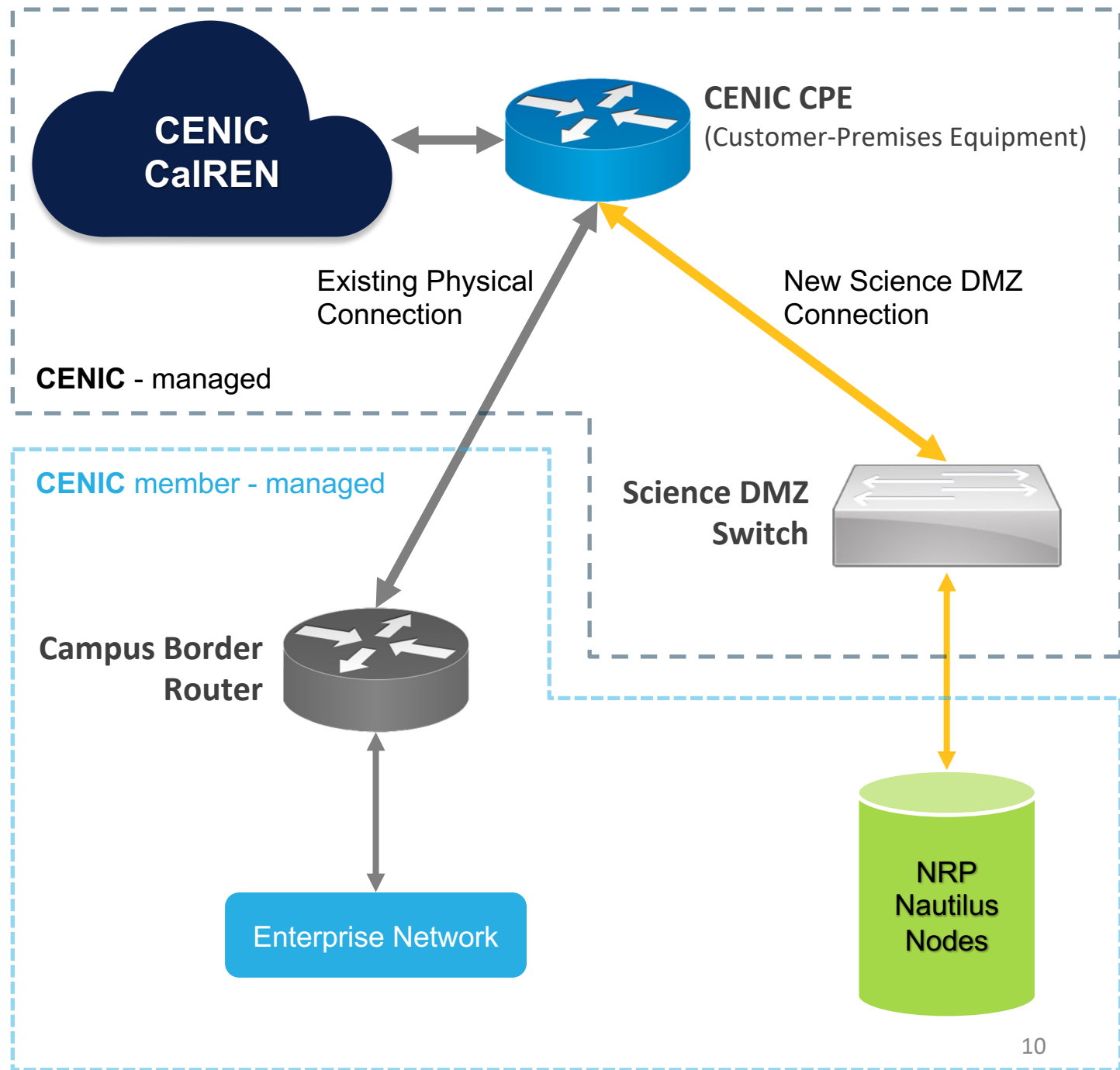
In-Development
CENIC Option 3: Remote Science DMZ

❖ Streamlined access to computing resources at other campuses.

❖ Supports educational and research programs at campuses that cannot host their own computing infrastructure.

CENIC CPE
(Customer-Premises Equipment)

CENIC CalREN

VLAN to Campus 2 ScienceDMZ

CENIC - managed

Existing Physical Connection

Campus 1
CENIC member - managed

Campus Border Router

Campus 2
Local Science DMZ

Computing Lab

Enterprise Network

NRP Nautilus Nodes

In-Development
CENIC Option 4: Managed Science DMZ

❖ CENIC handles the networking, so the member can focus on the computing.

❖ CENIC provides and remotely manages a dedicated Science DMZ switch.

❖ CENIC member must provide space, power, remote hands, fiber runs, etc., to support the CENIC device.

❖ No complex routing required—CENIC provides a default gateway.

❖ *Currently offered only for CENIC-AIR use cases.*

CENIC CaIREN

CENIC CPE
(Customer-Premises Equipment)

Existing Physical Connection

New Science DMZ Connection

CENIC - managed

CENIC member - managed

Science DMZ Switch

Campus Border Router

Enterprise Network

NRP Nautilus Nodes

Thank You!

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CENICAIR
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