IETF ForCES: Adding Protocol to the Promise of Network Processing

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September 10, 2001

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Agenda

- Market Environment

- APIs and Protocols for Rapid Innovation

- ForCES Protocol Requirements
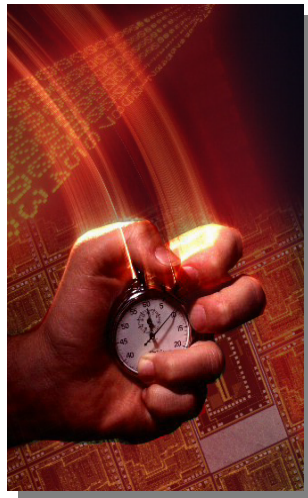
- Real World Implementation

Market Environment

Trends

- **Services Moving into the Network**
- **Service Processing Happens Everywhere**

Impact

- **Fast Rollout of New Services & Protocols**
- **Remote Upgradability of Network Equipment**
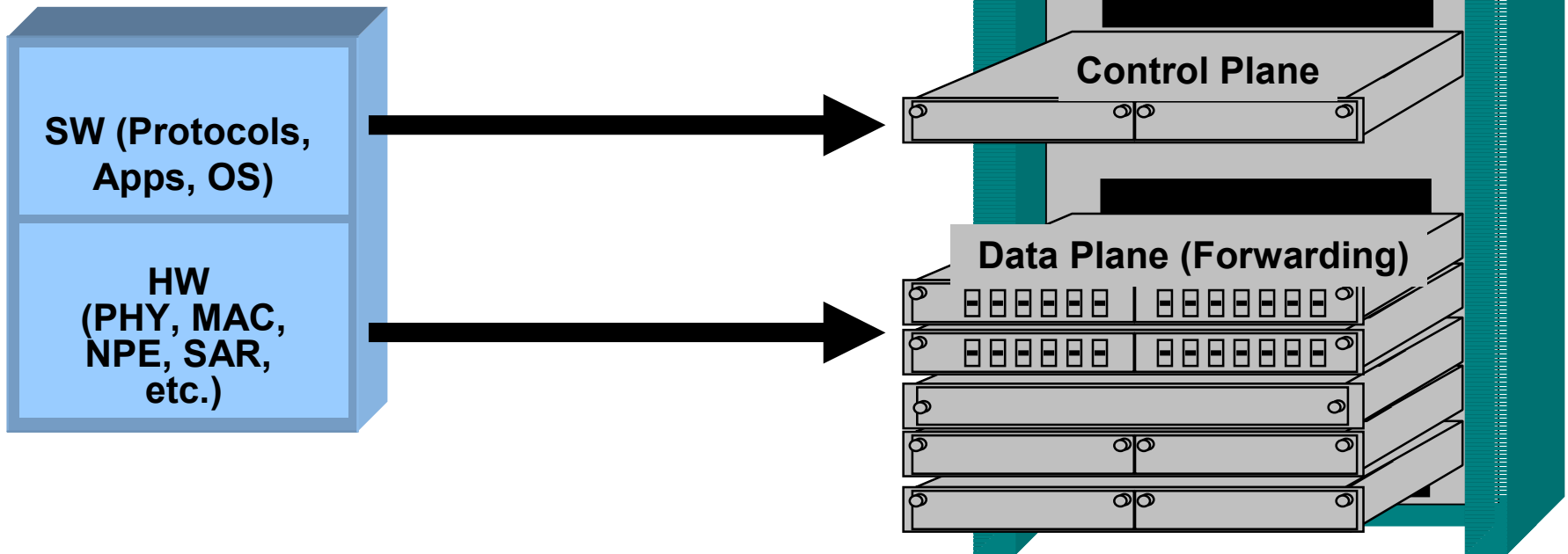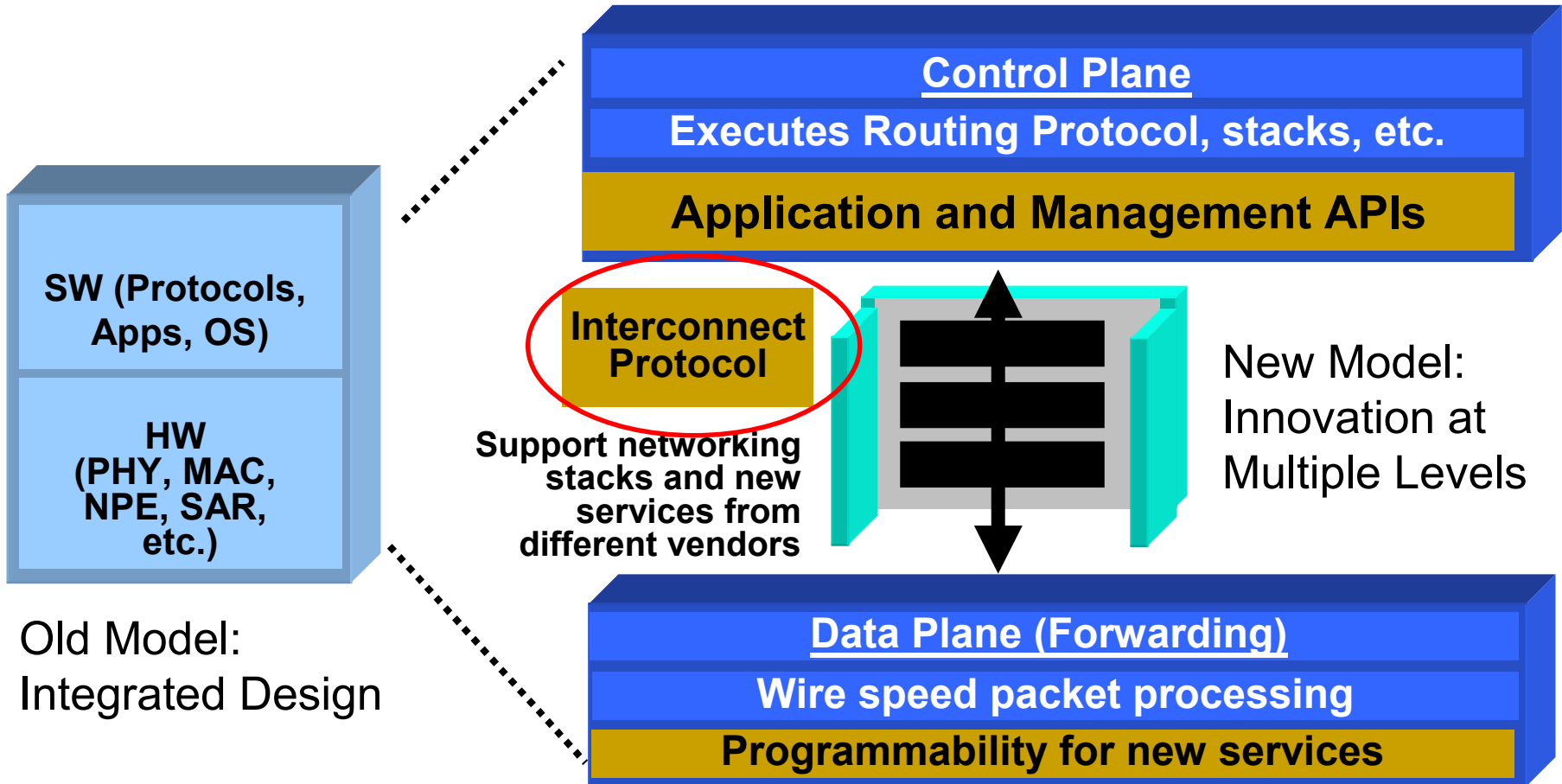- **Interoperability & Scalability**

 = **$**

Partitioning a Network Element

Physically

Backplane, Bus,
Switch Fabric, etc.

SW (Protocols,
Apps, OS)

HW
(PHY, MAC,
NPE, SAR,
etc.)

Control Plane

Data Plane (Forwarding)

Building the Network Element

SW (Protocols, Apps, OS)

HW (PHY, MAC, NPE, SAR, etc.)

Old Model: Integrated Design

Control Plane

Executes Routing Protocol, stacks, etc.

Application and Management APIs

Interconnect Protocol

Support networking stacks and new services from different vendors

New Model: Innovation at Multiple Levels

Data Plane (Forwarding)

Wire speed packet processing

Programmability for new services

Completing the Network Element

SW (Protocols, Apps, OS)

HW (PHY, MAC, NPU, SAR, etc.)

Control Plane

Executes Routing Protocol, stacks, etc.

NP Forum APIs

Interconnect
IETF ForCES protocol

Control Messages

Data Plane (Forwarding)

Wire speed packet processing

Programmability for new services
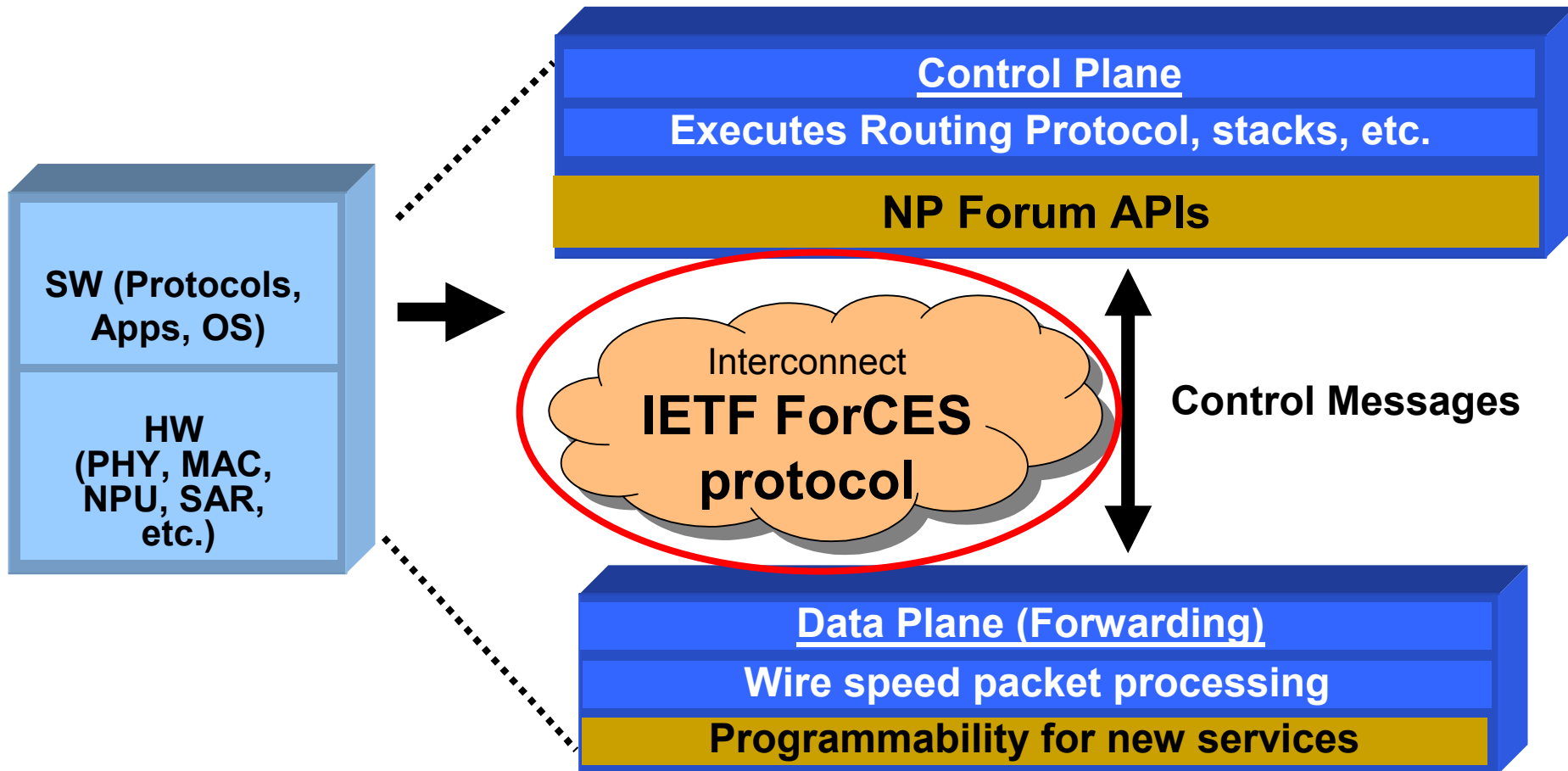
NP Forum APIs and IETF ForCES* Protocol foster rapid innovation for Network Equipment Design

* Forwarding and Control Element Separation

www.npforum.org
www.sstanamera.com/~forces

ForCES Protocol Requirements
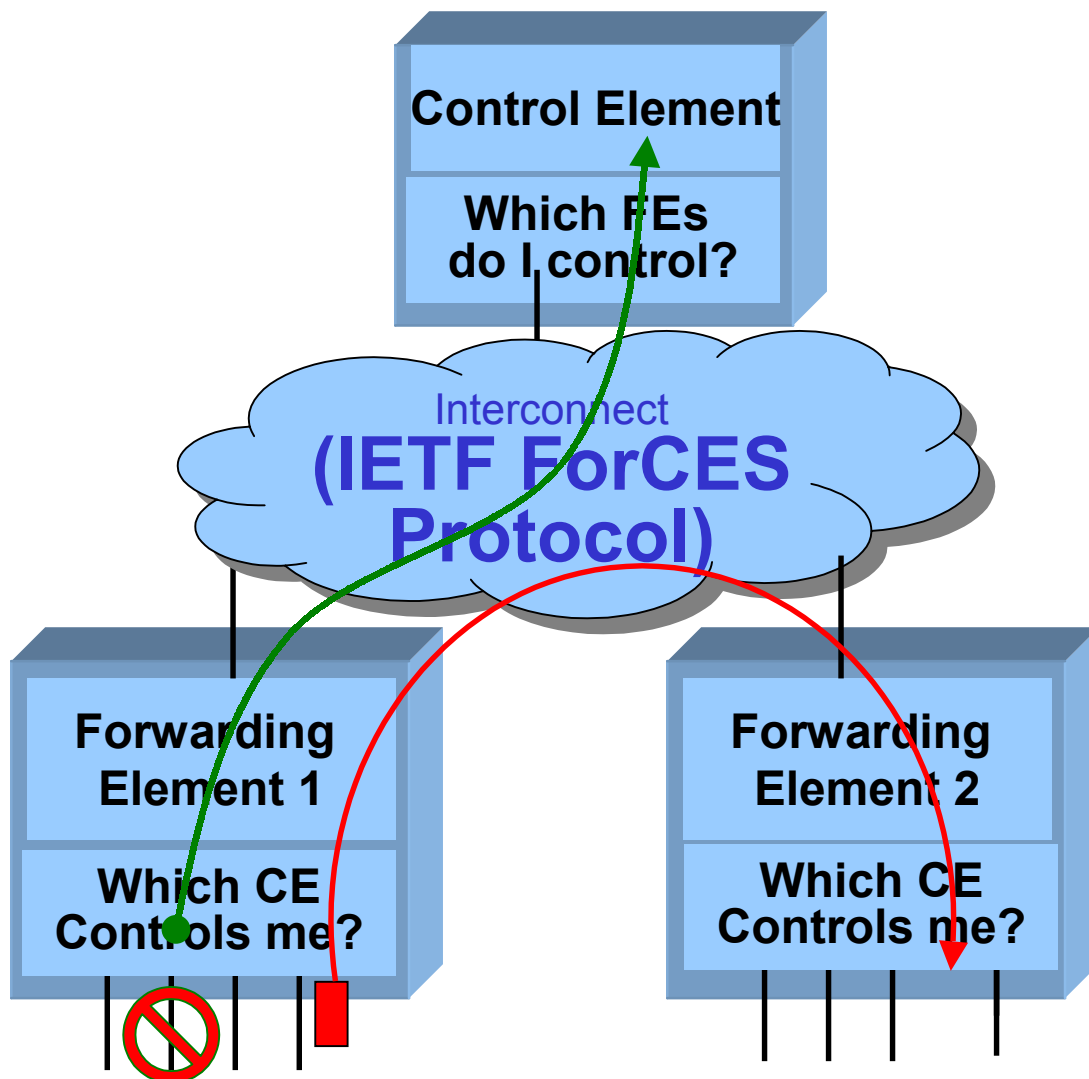
Why is it required?

- Provides **Flexible** connectivity between the control plane and data plane(s) via any interconnect

Infinibnd, cPCI, .

Chassis and CPE

Ethernet, ATM, Wireless, …

What is required?

- **Scalable** to multiple data planes without programming changes
- **Interoperable** between all control and forwarding planes

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Requirements of the Protocol

Control Element

Which FEs do I control?

Interconnect
(IETF ForCES Protocol)

Forwarding Element 1

Which CE Controls me?

Forwarding Element 2

Which CE Controls me?

Flexible

- Variety of interconnects
- Many CE-FE combinations

Scalable

- Topology discovery
- Packet Forwarding
  - Single Box

Interoperable
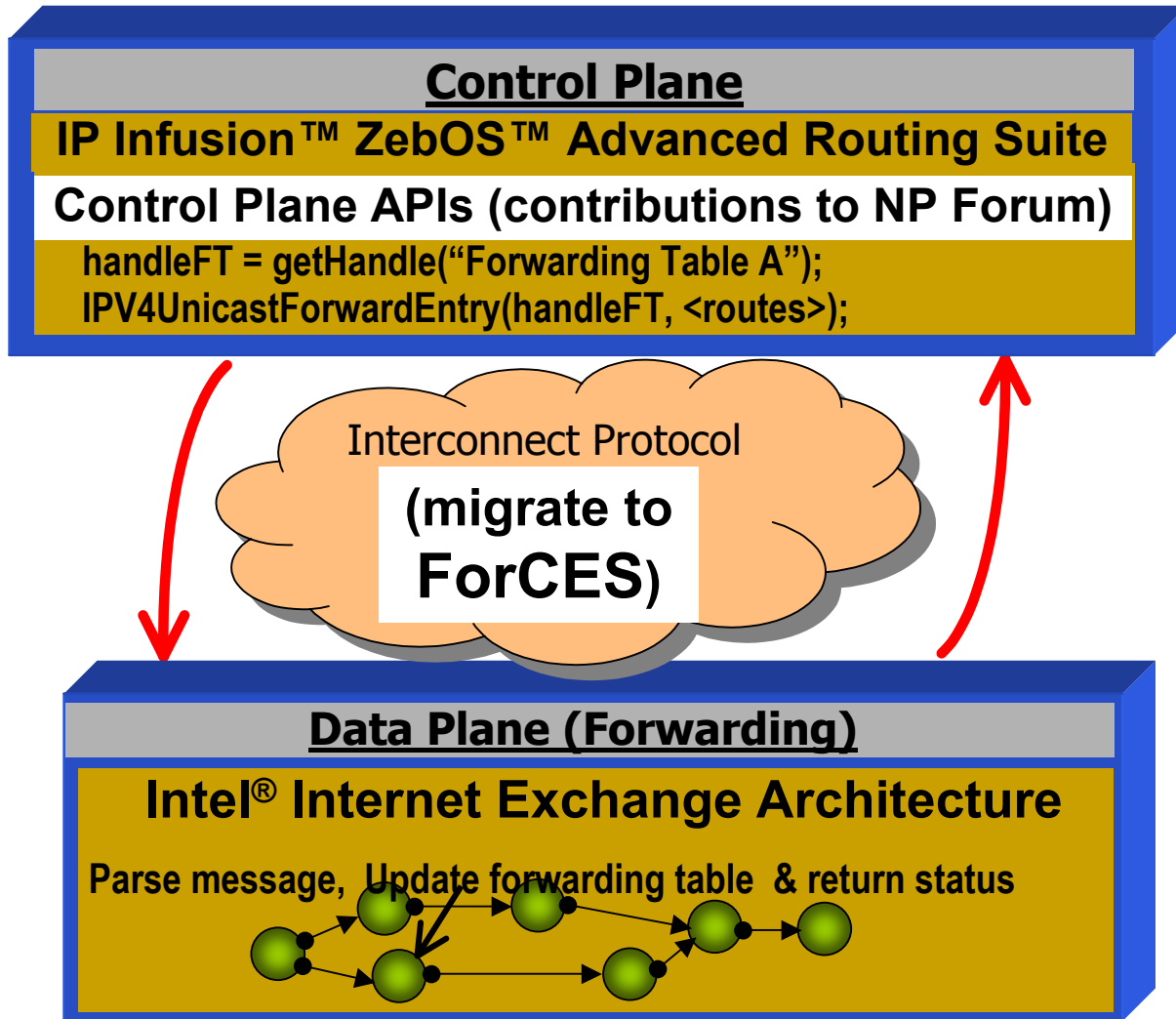
- Event notification
- Configuration
- Statistics gathering

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ForCES Protocol is flexible, scalable, and interoperable

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IP Infusion – Intel: Forwarding Table Update

1) **ZebOS™ Network Services Module invokes API calls to**

- get handle
- update fwding table

2) **Corresponding message sent over interconnect**

3) **Data Plane parses message, updates forwarding table, returns status**

Control Plane

IP Infusion™ ZebOS™ Advanced Routing Suite

Control Plane APIs (contributions to NP Forum)

handleFT = getHandle("Forwarding Table A");
IPV4UnicastForwardEntry(handleFT, <routes>);

Interconnect Protocol

(migrate to ForCES)

Data Plane (Forwarding)

Intel® Internet Exchange Architecture

Parse message, Update forwarding table & return status

NPF/ForCES: Rapid Time to Market, Longer Time in Market

Summary

- **Time = Money** – need fast service rollout, upgradability, scalability, interoperability

- **NP Forum APIs and ForCES** – foster rapid innovation in Network Equipment Design

- **ForCES** - a flexible, scalable, interoperable protocol for forwarding-control plane separation

- **Intel and IP Infusion** – Full routing interoperability with industry standard routing platforms: rapid Time to Market, longer Time in Market

Call to Action

- Adopt Intel® Internet Exchange Architecture (IXA)
  ## www.intel.com/design/ixa

- Adopt IP Infusion ZebOS Advanced Routing Suite
  ## www.ipinfusion.com

- Join us in the Network Processing Forum
  ## www.npforum.org

- Join us in the IETF ForCES effort
  ## www.sstanamera.com/~forces