

# **SDN Use Cases: Leveraging Programmable Networks**

**Information Technologies Group (ITG)  
Enterprise Technologies Unit  
NEC Corporation of America**

# Agenda

Networking Challenges – Why do we need SDN?

NEC OpenFlow Solutions

Software Defined Network Use Cases

- Data Center

- Nippon Express: Multi-tenant Data Center Networks
- Genesis Hosting: Public Cloud
- NEC Software Test Lab: Data Center Redundancy
- Traffic Management 10GbE
- Network Forensics for Big Data
- Tervela: Deterministic Performance
- Selerity: Entitlement Driven Content Distribution

- Campus

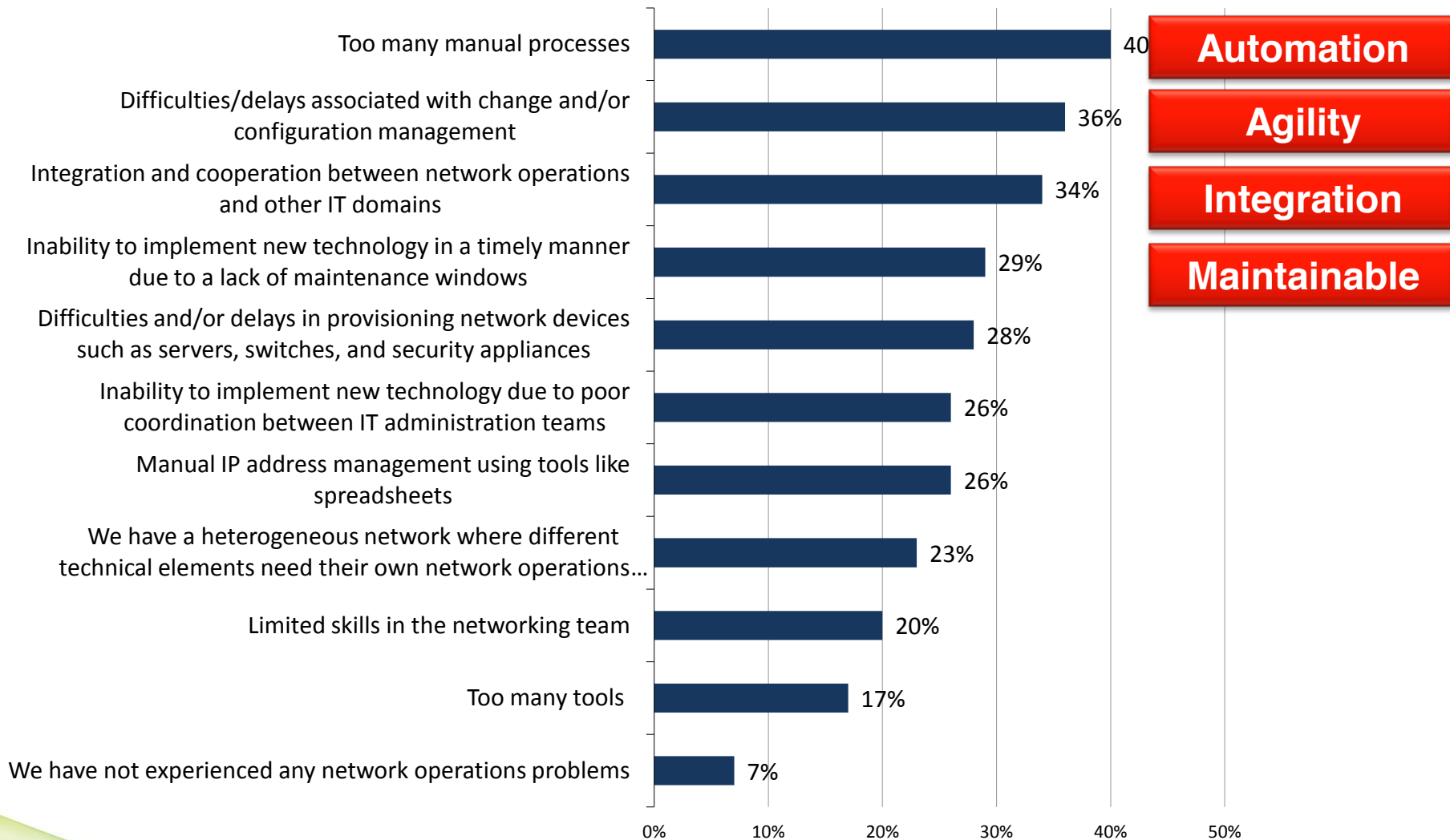
- Stanford University Campus OpenFlow

- R&E

- ES.net: Wide Area Network Virtualization using Oscars and OpenFlow
- NDDI: Software Defined Network Platform

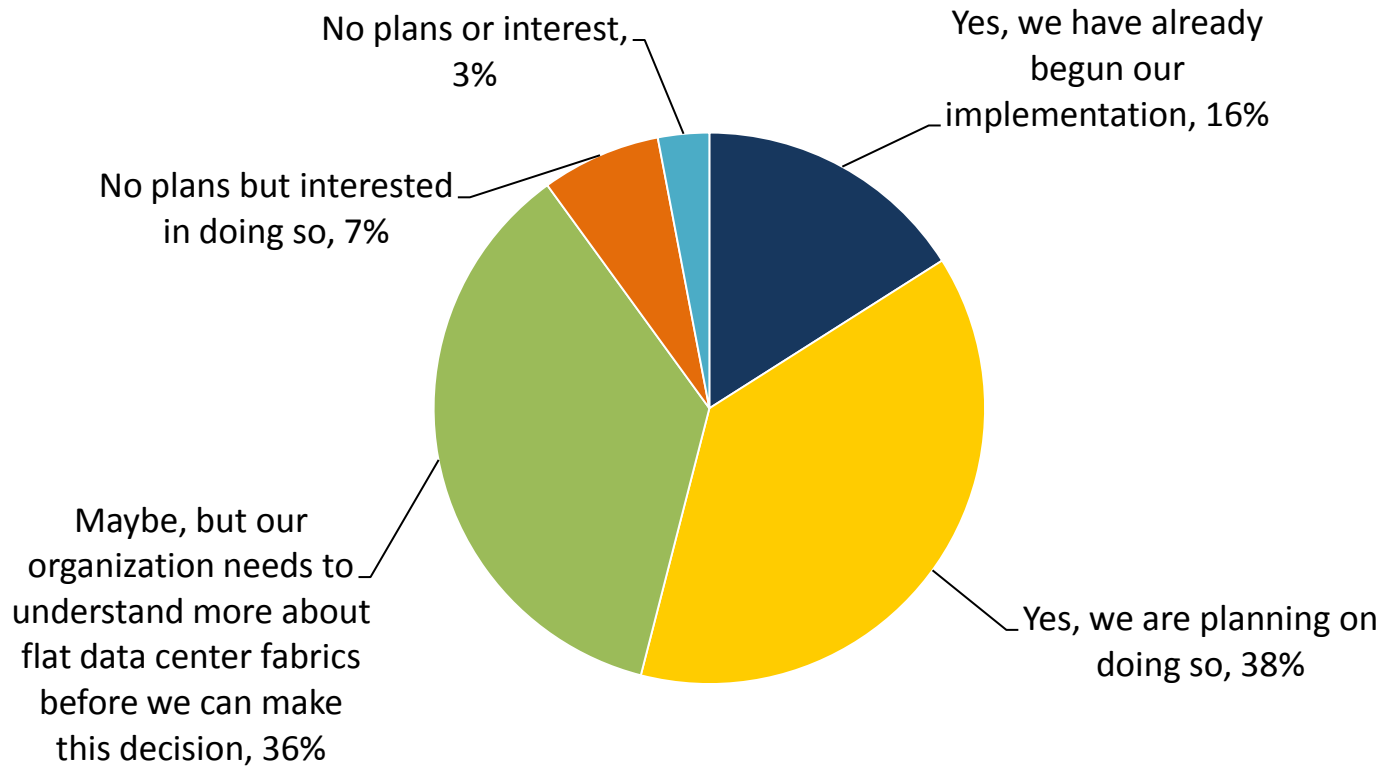
# What are the challenges of managing a datacenter network?

Has your organization experienced any of the following network operations problems? (Percent of respondents, N=280, multiple responses accepted)



# Plans for Implementing Flat Data Center Fabrics

Do you believe your organization will implement a flat data center fabric in the future? (Percent of respondents, N=240)



# Introducing ProgrammableFlow

## Simple, Scalable, Secure, Open Networking

- First OpenFlow Enabled Fabric
- Secure, Barrier Free Network Virtualization
- Variety of applications: Cloud services, network aggregation, monitoring, DDOS, appliance pooling, and many others

### **UNIVERGE** PF series

ProgrammableFlow Controller (PFC)



ProgrammableFlow Switch Family (PFS)



**Grand Prix**



**Special Prize**

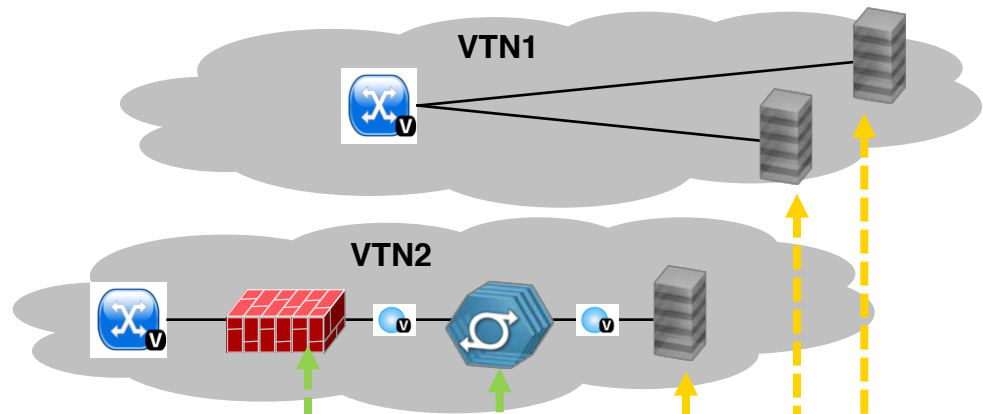
# Nippon Express: Data Center Consolidation

Multi-Tenant Network OpenFlow network reduces complexity and increases flexibility

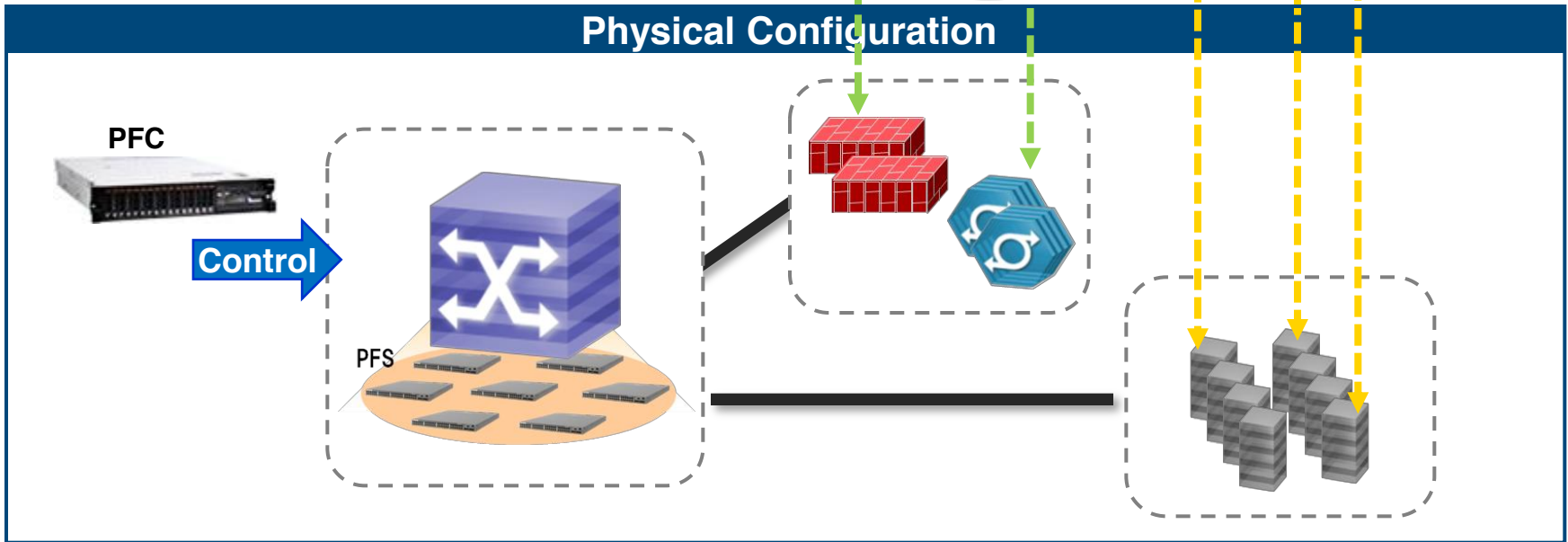
Trucking Company #1



Trucking Company #2



## Physical Configuration



Genesis Hosting Solutions provides one of the most flexible hosted computing service available today. Genesis 'build-your-own cloud environments' enables customers to build and provision customized, highly available virtual machine clusters.

## Networking Challenges

- Time to implement and complexity of network reconfigurations
- Inconsistent protocol support across network gear

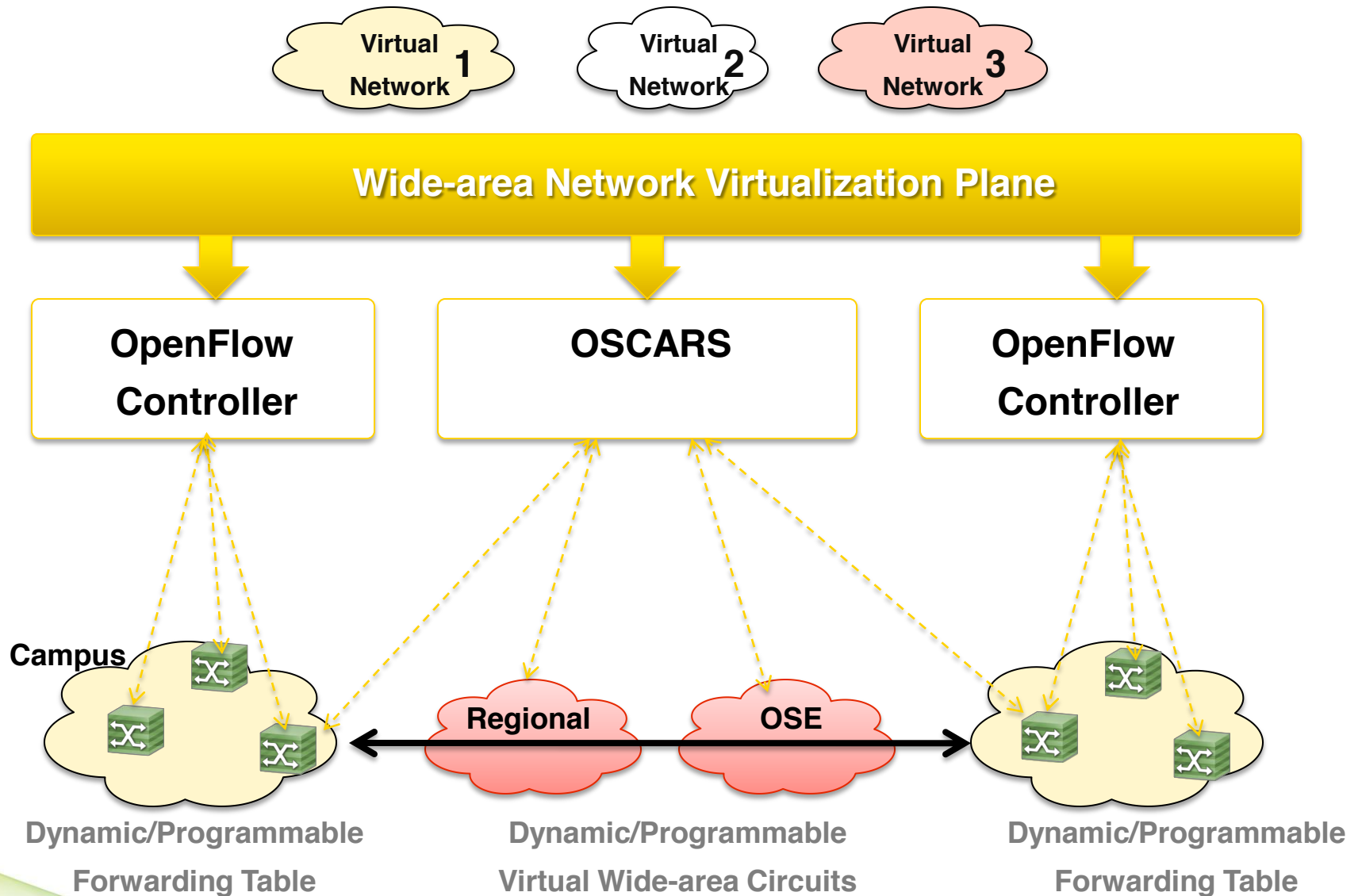
## Customer Goals

- (1) Create Strategy for Mass Scale without increasing network complexity
- (2) Add new services without hardware upgrades
- (3) Maintain and improve network SLAs

## Decision Factors

- Interoperability with existing Infrastructure
- Independent IP Range and IP Gateway address assignments
- Scalable, robust network without need to change existing network design
- Ability to create new per tenant network services

# ES.Net: Wide-Area Network Virtualization



# National OpenFlow Backbone – NDDI OS3E

## Background

Network Development and Deployment Initiative (NDDI) is a Partnership between **Internet2, Indiana University** and the **Clean Slate Program at Stanford University**

Goal is to create a new network platform and complementary software to support global scientific research  
Internet2 Network service called the Open Science, Scholarship and Services Exchange (OS3E).



*Internet2's success in deploying NEC OpenFlow switches for research networks made NEC a natural candidate for the OS3E production network. The NEC PF5820 met all of our evaluation objectives and the initial deployment with ProgrammableFlow has gone well – completely as expected."*

- Matt Davy, co-director of the Internet2 NDDI program and Chief Architect for Indiana University

## Initial Deployment 5 NEC PF5820s

- McLean, VA
- Chicago, IL
- New York City, NY
- Seattle, WA
- Los Angeles, CA

# The New Era of Open Networks



**ProgrammableFlow**

## Simple

- Deploy Multi-Tenant Virtual Networks as easily as deploying VMs
- Integrate network and application policy
- Centralized network management and control
- Eliminates need for spanning tree or other distributed protocols

## Scalable

- Scales from single switch to entire data center fabric
- Policy based appliance integration

## Secure

- Integrated Multitenant Access Control

## Open

- Create multivendor OpenFlow enabled switches, virtual switches and NICs

[necam.com/pflow/](http://necam.com/pflow/)

