Решения для управления и мониторинга сетевой инфраструктуры

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Управление и мониторинг

- Cisco Prime Infrastructure
- Cisco APIC-EM
- Cisco Identity Services Engine
Сеть в эпоху цифровизации
The Digital Business

Simplify/Automate Processes
Leads To:
Faster Time to Market
Leaner Operations

Empower Workforce
Efficiency and Innovation
Leads To:
Increased Productivity
Better Retention

Personalize Customer/Citizen Experience
Leads To:
Increased Loyalty
Greater Insight

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Сеть – связующее звено инноваций

Digital Solutions
Workforce Experience, Customer Experience, Business Operations, City Operations

IT Capabilities
Delivered from Edge to Cloud Connectivity, Security, Automation, Insight

Collaboration, Analytics, Security, Cloud, Datacenter, IoT

Network
Сложности текущих сетей на пути цифровизации

- Множественное управление коробками
- Ограниченное понимание приложений
- Слабая гибкость в ответ на новые требования
- Управление коробками

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На пути к цифровизации

95% Сетевых изменений проводятся вручную

70% Нарушений политик - «человеческий фактор»

75% OpEx сетевых подразделений

Troubleshooting/ Monitoring

Цифровизация требует трансформации сети

Source: 2017 Cisco Study
Преимущества от Enterprise SDN

Абстракция
Brownfield and Greenfield
Embedded best practices
Massive Simplicity

Контроль
Centralized policy
Network wide deployment
Dynamic Network Agility

Автоматизация
Zero touch deployment
Day 0 to Day N
Lower TCO

Программируемость
Published NB API’s
Cisco and Partner Apps
Openness

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Digital Network Architecture (DNA)

Cloud Service Management
Policy | Orchestration

Open APIs | Developers Environment

Automation
Abstraction and Policy Control from Core to Edge

Analytics
Network Data, Contextual Insights

Virtualization
Physical and Virtual Infrastructure | App Hosting

Network-enabled Applications

Cloud-enabled | Software-delivered

Automation & Assurance

Security & Compliance

Insights & Actions

Principles
Digital Network Architecture (DNA)
Enable Automation and Security at Scale

CUSTOMER OUTCOMES
- Design and Deploy
- Application Experience
- Next-Gen Fabric
- Analytics and Assurance
- Self-Optimizing

TECHNOLOGY ENABLERS
- Digital Network Architecture (DNA)
  Enable Automation and Security at Scale
DNA – Solution Components

Secure **Fabric** based extension of Policy and Assurance

**Policy** intent based Control and Assurance

Bespoke **Management** and Monitoring

---

APIC-EM

ISE

Cisco Prime Infrastructure
Отличия DNA подхода от традиционного управления сетью

Fabric
Превращаем сеть в «фабрику»

Controller Abstraction
Политики – новый язык сетей

Best Practices Based
Лучший дизайн встроен в софт

Integrated Security
Не только политики / настройки

Common Orchestration
Физические и виртуальные функции

Big Data Analytics
Инсайты, не только информация

IT Process Integration
Фокус на экосистеме интеграции
Предусловия для трансформации IT на встречу цифровизации

Upgrade the Infrastructure
Obновление HW на DNA совместимое
IOS-XE Everywhere
Fabric ready

APIC-EM Deployment
SDN движёк как предусловие разворачиваний приложений и сценариев цифровизации

ISE Everywhere
Персонализация и гранулярный доступ к сети
политики vs. конфигурации
С момента анонса Prime Infrastructure позиционировался как …

Платформа управления всей сетью: LAN, WLAN и WAN
Недавно стал доступным **APIC-EM**

SDN-ронтроллер автоматизации всей сети: LAN, WLAN and WAN
Software Defined Network Led Management

Traditional Management

Network Automation via Feature Configuration

SDN Led Management

Policy Automation

Customer developed provisioning tools, manual CLI changes, and run book automation for IT Operations support.

Controller (Policy and Control)

Management (Provisioning and Assurance)

Automation (Workflow / Orchestration)

Customer input on business / service intent

Traditional Management vs SDN Led Management

Network Automation via Feature Configuration -> Policy Automation
Network vs. Policy Automation

Network based Automation/Configuration:
- Executed by Prime Infrastructure
- Focused on feature configuration
- **Customizable**
- Expert Led

Policy based Automation:
- Executed by APIC-EM Apps
- Business intent to network intent
- **Prescriptive**
- Business driven
Эволюция автоматизации политик

Расширение политик за счёт новых приложений и сервисов SDN

Oct 2015
Эволюция обновления сетевого софта
На примере эволюции автомобилей

- Slow
  - Tedious

- Unreliable
  - Slow

- Time Costly
  - Maintenance

- Complicated
  - Learning Curve

- Streamlined
  - Operational

- Simplified
  - Lower OPEX
  - Automated

XModem Upgrades
TFTP Upgrades
Upgrades via Script
Upgrades via NMS
Upgrades via Prime
Upgrade via DNA
Автоматизация управления сетевым софтом в DNA

1. Кардинальное упрощение процесса обновления

2. Жизненный цикл (SMU Lifecycle)

3. Гибкие встроенные Pre/Post upgrade проверки
Строительные блоки DNA

DNA

Identity and Security Policy  
Network Provisioning  
Network Analytics

PROVISION  
MONITOR  
TROUBLESHOOT

Enterprise Fabric

Wireless  
LAN  
WAN  
Cloud  
Remote Access
APIC-EM Controller Architecture

- **Scalable Platform**: Elastic service infrastructure and auto scale service model
- **Highly Available**: Maximum uptime for mission-critical applications and seamless upgrade
- **Single Touch Point**: Fast and easy installation
- **Northbound RESTful APIs**: RBAC-enabled

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APIC-EM – архитектура платформы

**APIC-EM Applications**
- Network PnP
- IWAN
- Path Trace
- Network Inventory
- Advanced Topology Visualizer
- Easy static and dynamic QoS

**APIC-EM Controller**
- Northbound REST APIs

**APIC-EM Services**
- Inventory Manager
- RBAC
- Policy Analysis
- Policy (QoS)
- Topology Services
- Data Access Service
- Network PnP
- IWAN Services

**Grapevine**
- Elastic Service Infrastructure

**Addresses Scale Out and HA Requirements**
Cisco Identity Services Engine
Cisco Unified Call Manager
Prime Infrastructure
Cisco APIC-EM
SDN controller

Discovery
Topology
Plug-n-Play
Path Trace
Easy QoS
IWAN
ESA

Партнёрские приложения:
- Работа с VDI
- ....

Дальше больше:
- Безопасная сегментация сети
- ... и множество других сценариев
Демо: 12 апреля, начало в 13-45

Автоматизация управления приложениями с использованием принципов SDN-технологий

Компания «ИТ-Интегратор» представит демонстрацию автоматизации процессов настройки и управления корпоративной сетью на основе технологии Cisco APIC-EM. Решение помогает оптимизировать операционные затраты, значительно сократив время на развертывание новых сервисов и сделав сеть более интеллектуальной и нацеленной на приложения.
Fabric
A Fabric is a combination of an Overlay and a Underlay

An “Overlay” is a logical topology used to virtually connect devices, built on top of an arbitrary physical “Underlay” topology.

An “Overlay” network often uses alternate forwarding attributes to provide additional services, not provided by the “Underlay”.

Примеры технологий оверлейев

- GRE or mGRE
- MPLS or VPLS
- IPSec or DMVPN
- CAPWAP
- LISP
- OTV
- DFA
- ACI

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Упрощение части сети до единой «фабрики»

Virtual Networks

Underlay Network

Outer/Transport IP-UDP Header

VXLAN Header

Original IP Packet or L2 Frame

Control Plane

Data Plane
Software Defined Access

Secure Segmentation
- Flexible User/Device Grouping
- Basic Segmentation
- Micro Segmentation

Simplified Provisioning
- Device Onboarding
- Automated Workflows
- Consistent Policy

Monitoring & Troubleshooting
- Easy Management
- Proactive Network Health Monitoring
- Contextual Analytics
Зачем ISE?

Видеть детали по пользователям и устройствам

Контролировать доступ по всей сети (SDN ready!)

Ограничьте угрозы и остановите атаки
Множество сценариев применения

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Security</th>
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<tbody>
<tr>
<td><strong>Network</strong></td>
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<tr>
<td><a href="http://cs.co/ise-network">http://cs.co/ise-network</a></td>
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<td>Visibility</td>
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<tr>
<td>Guest</td>
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<td>Access Control</td>
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<td>ACS Migration</td>
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<td>Network as a Sensor/Enforcer</td>
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<tr>
<td><strong>Mobility</strong></td>
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<td><a href="http://cs.co/ise-mobility">http://cs.co/ise-mobility</a></td>
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<td>Guest</td>
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<td>BYOD</td>
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<td>Prime Integration</td>
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<td>Location Services</td>
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<td><strong>Security</strong></td>
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<td>Visibility &amp; Enforcement (NVE)</td>
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<td>Compliance</td>
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<td>Threat Reduction</td>
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<td>TrustSec</td>
<td></td>
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<tr>
<td>Identity Firewaling</td>
<td></td>
</tr>
<tr>
<td>Ecosystem Partners</td>
<td></td>
</tr>
</tbody>
</table>
Что нового в ISE?

- Threat-Centric NAC
- ISE Technology Partner & pxGrid Enhancements
- ACS to ISE Migration
- Dashboard Enhancements
- AnyConnect Posture Enhancements with Version 4.4
- ISE DEFCON
- Anomalous Behavior Detection
- Application Visibility
- Posture Administration
- ISE Setup for Wireless
- TrustSec / ACI Policy Plane Integration

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Cisco
ISE Visibility Setup Wizard

- 5 page wizard for ISE to discover network assets and endpoints.
- Join Active Directory.
- New Standalone ISE deployments only.
Context Visibility: User Views
ISE Dashboard Summary
ISE Dashboard – Endpoints
Endpoint Application Visibility

![Cisco Identity Services Engine interface](image)

**Endpoint Details for 98:4B:4A:09:5A:28**

- **MAC Address**: 98:4B:4A:09:5A:28
- **Username**: Big_Boss
- **Endpoint Profile**: Mac Book Pro (Retina, 15-inch, 2.2 GHz Intel Core i7)
- **Current IP Address**: 1.1.2.1
- **Location**: San Jose, CA United States

**Applications**

<table>
<thead>
<tr>
<th>Application name</th>
<th>Version</th>
<th>Vendor</th>
<th>Running process path</th>
<th>Process Name/Hash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco AnyConnect</td>
<td>98.55.98</td>
<td>Cisco</td>
<td>C:\program files\Cisco\cisco anyconnect\vpnagent.exe</td>
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<tr>
<td>Visual Studio 2005 professional edition</td>
<td>10.0.40219</td>
<td>Microsoft</td>
<td>5172</td>
<td>msppacv.exe</td>
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<tr>
<td>Winzip</td>
<td>12.1.8519</td>
<td>Winzip Computing</td>
<td>Not running</td>
<td>No traffic</td>
</tr>
<tr>
<td>Firefox</td>
<td>44.0.2</td>
<td>Mozilla</td>
<td>Not running</td>
<td>No traffic</td>
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</table>

**Process ID**

<table>
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<td>178E-1B24D29704D66E581A41F758953C14127BC54F0FA1719319E1A709E45FA</td>
<td></td>
</tr>
</tbody>
</table>
Cisco ISE – связующее звено на уровне политик

NOTE: ISE is included in bundles like Cisco ONE, SVP, and Security ELA. Emphasize the value of the ISE integration story when selling these packages.
Соединяем «фабрики» политикой
VXLAN with Campus Fabric

• In Campus Fabric - Fabric Edge Nodes use LISP functions to lookup a VXLAN tunnel to use for a given Dest IP

• Traffic encapsulated in VXLAN with SGT and VRF sent to correct Fabric Edge Node

• Egress switch applies SGACL as normal
ISE and APIC data plane translation

ISE & APIC Exchange Groups and Member information

ISE creates SGT to EPG translation table

Send translation table to ASR 1K/N7K

IP, SGT mappings

IP-ClassId, VNI bindings

APIC - Application Policy Infrastructure Controller, ACI - Application Centric Infrastructure

*ASR1K (ship) N7K (plan)
Модель политик Cisco SDN – от филиала в ЦОД

СОГЛАСОВАННАЯ ПОЛИТИКА ДЛЯ ОБЛАКА, ЦОД, WAN И УРОВНЯ ДОСТУПА

**Application Centric Infrastructure**

ЦЕНТР ОБРАБОТКИ ДАННЫХ

Сетевой профиль потока приложений

SLA, безопасность, QoS, балансировка нагрузки

Облако

ЦОД

SETA WAN И СЕТЬ ДОСТУПА

Сетевой профиль пользователя или объекта

QoS, безопасность, SLA, устройство, местоположение, роль

WAN

Доступ

ПОЕКТЫ НА ОСНОВЕ ИМЕЮЩЕЙСЯ ИНФРАСТРУКТУРЫ И РАЗРАБОТКИ С НУЛЯ

ПРЕИМУЩЕСТВА Cisco

КОМПЛЕКСНОСТЬ

СТРУКТУРА ПОЛИТИК: ОРИЕНТАЦИЯ НА ПОЛЬЗОВАТЕЛЕЙ И ПРИЛОЖЕНИЯ
Prime Infrastructure
System Dashboard – Overview

- System Information
- Live Trend Information

CPU Utilization (%): 2.75
Memory Utilization (%): 46.00
Disk Utilization (%): 9.32

Data Cleanup
- Time Frame: Past 2 Week
- Apply

Backup Information
- Time Frame: Past 2 Week
- Apply

Last Poll Time: Wednesday, February 22, 2017 at 10:24:00 PM IST
Полностью настраиваемая консоль
Только браузер
Вся сеть на одной странице
детализация по каждому инциденту

|------------|---------------|----------------------------------------|--------------|----------------|-----------------------------|-----------------------------|

**Общая информация**

- **Источник**: 10.0.0.2
- **Обработан**: Да
- **Категория**: Сетевые и узлы
- **Причина**: Сетевые и узлы
- **Дата обнаружения**: 22 сентября 2016 г., 18:29:18 PM
- **Дата обновления**: 6 февраля 2017 г., 8:35:35 PM
- **Сервис**: Russia TZ 2 Standard Time
- **Состояние**: Обработан
- **Тип**: Сетевые и узлы
- **IP**: VSS-САТ6800-дист
- **Устройство**: Cisco Catalyst 6800 Series Switches
- **Время**: 22 сентября 2016 г., 18:29:18 PM
- **Время**: 6 февраля 2017 г., 8:35:35 PM
- **Расположение**: Russia TZ 2 Standard Time
- **Заявка**: Germany, Server: Standalone, T...
- **Предыдущее состояние**: Критичный
- **Состояние**: Критичный

**Сообщения**

- VLAN несовпадение обнаружено на GigabitEthernet101/2/6/47 (1), с VSS-САТ6800-дист GigabitEthernet101/2/6/48 (200).
Настройка параметров оповещения

• Выбор событий для срабатывания оповещений

• Назначение оповещений на Device Groups/Location Groups, Port Groups
Встроенный syslog-сервер

• Поиск по событиям
• Создание оповещений
• на основе syslog-сообщений
Мониторинг производительности
Инвентаризация

Доступ к полной информации об оборудовании

<table>
<thead>
<tr>
<th>Маршрутизатор</th>
<th>IP-адрес</th>
<th>Проблемы</th>
<th>Статус</th>
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<tbody>
<tr>
<td>RT001</td>
<td>192.168.0.2</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>RT002</td>
<td>192.168.0.3</td>
<td>✔️</td>
<td>✔️</td>
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<td>RT003</td>
<td>10.10.30.1</td>
<td>✔️</td>
<td>✔️</td>
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<td>RT004</td>
<td>10.10.40.1</td>
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<td>RT008</td>
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<td>✔️</td>
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</tbody>
</table>

CPU Utilization (1 Hour)
- Minimum: 1.00%
- Average: 1.00%
- Maximum: 1.00%

Memory Utilization (1 Hour)
- Minimum: 15.00%
- Average: 15.00%
- Maximum: 15.00%

Alarms
- GigabitEthernet3
- GigabitEthernet1
- GigabitEthernet2
- Null0
- VoIP-Null0

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Конфигурация оборудования

Использование преднастроенных шаблонов

Создание собственных шаблонов
Результаты изменения конфигурации

Статистика по каждому оборудованию

Кто именно запустил изменение
Аудит конфигураций

Настройка политик соответствия

Настраиваемые собственные правила
Управление конфигурациями

- Архивирование
- Восстановление
- Сравнение
Мониторинг приложений (AVC)
Оценка возможности внедрения AVC

The Cisco Application Visibility and Control (AVC) solution is a suite of services in Cisco network devices that provides application-level classification, monitoring, and traffic control in order to:
- Improve business-critical application performance
- Support capacity management and planning
- Reduce network operating costs

For more information on Cisco Application Visibility And Control, click here.

Readiness Assessment helps in analyzing and detecting AVC capable and incapable wired routers. It also suggests appropriate actions to be taken. In order to improve AVC support/capability, Readiness Assessment for the following families of wired routers are supported:
- Cisco Integrated Services Routers 2nd Generation (ISR4000)
- Cisco ASR 1000 Series Aggregation Service Routers (ASR1K)
- Cisco Cloud Services Router 1000V Series (CSR)

<table>
<thead>
<tr>
<th>Location</th>
<th>Device Name</th>
<th>Device Type</th>
<th>Device IP</th>
<th>Image Version</th>
<th>AVC Capability</th>
<th>App Visibility Act</th>
<th>QoS Activation</th>
<th>Recommended Actions</th>
<th>NBAR2 Active P-P</th>
<th>NBAR2 Active P-P</th>
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<tbody>
<tr>
<td>...ons/TME-LAB/NEW YORK</td>
<td>NYC-RTR-INET</td>
<td>Cisco 4451 Series Integrated ...</td>
<td>10.16.255.2</td>
<td>15.5(3)S2</td>
<td>Capable</td>
<td>Active</td>
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<td></td>
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<tr>
<td>...ons/TME-LAB/AMSTERDAM</td>
<td>AMS-ASR1K-MPLS</td>
<td>Cisco ASR 1002-X Router</td>
<td>10.11.1.1</td>
<td>15.5(3)S2</td>
<td>Incapable</td>
<td></td>
<td></td>
<td></td>
<td>Advanced 14.0</td>
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<td>...ons/TME-LAB/AMSTERDAM</td>
<td>AMS-ASR1K-INET</td>
<td>Cisco ASR 1002-X Router</td>
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<td>15.5(3)S2</td>
<td>Capable</td>
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<td>Cisco ASR 1004 Router</td>
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<td>...ons/TME-LAB/NEW YORK</td>
<td>NYC-RTR-MPLS</td>
<td>Cisco 4451 Series Integrated ...</td>
<td>10.16.1.1</td>
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<td>Active</td>
<td>Active</td>
<td>Advanced 14.0</td>
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<td>...cations/TME-LAB/POTWIN</td>
<td>INET_Hub.cisco.com</td>
<td>Cisco ASR 1001-X Router</td>
<td>192.168.139.185</td>
<td>15.5(3)S1a</td>
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Информация по клиентам

Детальная информация по каждому клиенту (проводные/беспроводные)

Интеграция с ISE
Оценка внедрения TrustSec

![Dashboard](image)

<table>
<thead>
<tr>
<th>Device Name</th>
<th>Categories</th>
<th>IP Address</th>
<th>Current Running Ver.</th>
<th>Feature</th>
<th>SGT Classification &amp; Mapping</th>
<th>SXP Support</th>
<th>SGT Tagging</th>
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<tr>
<td>VSS-CAT6800-dist</td>
<td>Cisco Catalyst 6800 Virtual Switch</td>
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<td>03.16.02.5</td>
<td>Classification &amp; Enforcement</td>
<td>IP to SGT, Subnet to SGT, L3IF to SGT</td>
<td>Speaker, Listener V4</td>
<td>SGT over Ethernet, SG...</td>
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<td>CORE-2</td>
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<td>CORE-3</td>
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Industry Class Config Baseline Compliance

• Leveraged from Prime Network (SP Offering)
• Works on most common Cisco platforms
  IOS, IOS-XE, IOS-XR, NX-OS, StarOS
• Flexible Rules engine including
  Input Parameters, Complex Logic, Condition Checking
• Customizable Policy including
  Violation Message, Severity & Fix CLI
• Ability to schedule recurring jobs
Оптимизация расходов: шаг со стороны вендора

Cisco ONE
Cisco ONE упрощает приобретение

1. Функциональные возможности ПО
   - Advanced Application
   - Advanced Security

2. Платформа
   - Физическая | Виртуальная
   - Беспроводная | Коммутация | Маршрутизация

3. Модель покупки
   - Традиционная
   - Подписка
   - Корпоративная модель