NEC Corporation, Japan

TELECOM CARRIER SDN SOLUTIONS: vCPE
Introduce NEC Activity in APAC

**NEC in APAC**

<table>
<thead>
<tr>
<th>Country</th>
<th>Company Names</th>
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<tbody>
<tr>
<td>Malaysia</td>
<td>NEC Corporation of Malaysia Sdn. Bhd.</td>
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<td>PERNEC Corporation Berhad</td>
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<td>Singapore</td>
<td>NEC Asia Pacific Pte. Ltd.</td>
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<td>Docilion Solutions Pte. Ltd.</td>
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<td>NEC STE Cloud Services Pte. Ltd.</td>
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<td>OilTech Asia Pacific Pte. Ltd.</td>
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<td>Vietnam</td>
<td>NEC Vietnam Co., Ltd.</td>
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<td>VINECO Telecommunication Systems Joint Stock Company</td>
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<tr>
<td>Thailand</td>
<td>NEC Corporation (Thailand) Ltd.</td>
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<td>Nippon Express NEC Logistics (Thailand) Co., Ltd.</td>
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<td>NEC TOKIN Electronics (Thailand) Co., Ltd.</td>
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<td>NEC Platforms Thai Co., Ltd.</td>
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<td>India</td>
<td>NEC India Pvt. Ltd.</td>
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<td></td>
<td>NEC HCL System Technologies Limited</td>
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<td>Delhi, Mumbai, Dhaka</td>
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<td>Philippines</td>
<td>NEC HCL System Technologies Limited</td>
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<td>Yangon, Dhaka</td>
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<td>Manila</td>
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<td>Australia</td>
<td>NEC Australia Pty. Ltd.</td>
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<td>Gsea Forest Plantation Company Pty. Ltd.</td>
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<tr>
<td>New Zealand</td>
<td>NEC New Zealand Limited</td>
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(As of Apr. 1, 2013)

Marketing & Service affiliates: 14
Manufacturing affiliates: 3
Liaison Offices: 1
Branch Offices: 6
Labs: 0
NEC Corporation (Thailand)

President : Mr. Hiroshi Sato
Established : 1st April, 2003
Employee : 350+

History :

NEC has been contributing for **IT and Network** society in Thailand for over 50 years. Through “C&C” concept which was introduced as the integration of Computer and Communication technology.

- In 1962, NEC established Bangkok Representative Office
- In 1967, NEC supplied a cross bar switching system to TOT
- In 1981, Digital switching system were supplied to Thailand
- In 1987, NEC Thailand Ltd. was founded
- In 2003, NEC Corporation (Thailand) Ltd. was founded

Business domain of NEC

For Public
- Public Safety
- Digital/Terrestrial TV Transmitters
- Satellite 「NEXTAR」

For Enterprises
- Industry Solutions
- Office Solutions

For Telecom carriers
- Long Term Evolution Network Systems
- Compact Microwave Communications Systems

For Smart energies
- Energy Management System
- Electric Vehicle (EV) Charging Infrastructure
- Energy Storage System

Solutions
- Cloud Infrastructure
  - NEC Cloud IaaS
- SDN Solution
  - NEC SDN Solutions
- Big Data
  - NEC Big Data Solutions

Products
- Server
- Unified Communications and Collaboration Solution
- PC/Tablet
- Display
NEC SDN solution for CSP

Focusing on 4 solutions to address the Carriers’ requirements.

1. Data Center SDN
   - Data Center/Networks
   - IaaS Platforms

2. Network Functions Virtualization
   - vEPC
   - vVNO
   - vHSS
   - vMS

3. Transport
   - Wireless SDN
   - Packet/Optical SDN

4. Operation & Orchestration
   - Service acceptance/provision
   - Disaster recovery, BCP
   - Traffic visualization/optimization
   - Service monetization

NFV solutions
Key Benefits of NFV

**CAPEX reduction**
- Network infrastructure commonly used for various services.
- Optimized resource provisioning according to network demand.

**OPEX reduction**
- Automatic provision and configuration through end user requirements.
- Automated maintenance and trouble shooting, reducing site visits.

**Flexible and faster new revenue creation**
- Small start, easily scaling service sizing in later stage.
- Prompt network building for a new service on common NFV infrastructure resources.

**Resiliency for traffic surge and disaster**
- Service continuity by switching over the service to geographically remote site at disaster.
- Flexible resource allocation and traffic handling among multiple sites according to demands

NEC NFV solutions

Network and Service node run on common Hardware by virtualization.
TCO reduction and new revenue creation
Carrier-grade availability, carrier-scale capacity and high-density performance achieved in virtualization.

Legacy Network Function
- Each function runs on particular hardware
- Hardware resource can’t be shared
- Proprietary equipment

Virtual Network Function
- Optimized resource provision for traffic demand/condition
- Hardware resource
- COTS servers
# NEC NFV Solution

### Openness
- COTS hardware
- OpenSource software platform
- Industry standards

### Interoperability
- Proven multi-vendor environment support
- Various cross vendors PoC and field service operation experience

### Scalability
- Auto-scaling and on-demand deployment

### Operation Efficiency
- Intelligent and automated resource allocation, scaling, recovery/healing
- Real-time closed loop optimization

### Carrier-Grade
- Enables resiliency, stability, reliability, performance
  - 99,999% availability

### Business Opportunities
- Quick new service startups and service development agility
- New revenue opportunities with dynamic service provisioning

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**vCPE**
Virtualized CPE Solution

- Traditional CPE -

Installation, upgrade and troubleshooting at an end-user home

-> Maintenance costs have increased

Many service changes lead to CPE and appliance upgrade or replacements

-> Operation costs have increased

Less visibility of customer premises

- Virtualized CPE -

Remote troubleshooting and no need to install additional devices

-> Reduce operation cost

Centralized and cost efficient CPE management

-> Reduce maintenance cost

Agile, Flexible and Dynamic network service through VAS solution

-> New Revenue Creation
Virtualized CPE Solution

Operation Cost Reduction

- OPEX optimization for subscriber support by minimizing engineer dispatch to customer premise
- Flexible service addition and home gateway upgrade can be done remotely by telecom carrier without replacing the hardware

New Revenue creation

- New revenue creation through flexible centralized services quickly
- Collaboration with 3rd Parties will enable to quickly expand the service portfolio that can be rapidly deployed to address large scale as well as niche markets

NEC vCPE Solution Feature

Carrier Grade Quality

- Carrier grade performance, capacity and quality in virtualization
  - High performance throughput with best-tuned data processing
  - High capacity for carrier scale network
  - Rich expertise in technology for telco carrier business

Service agility and Telco-driven VAS

- Various solution line-up
  - vCPE residential solutions will expand to enterprise solution
  - Various 3rd party appliances with open eco-system
  - End-to-end solution including suite of professional services

Network Virtualization leadership

- Released commercial vCPE
  - Launched PoC followed by commercial trial from Apr. 2015.
  - NEC has rich deployment experiences in global through commercial trials.
Residential vCPE - Home LAN Extension -

**Expand business to Home LAN services**

End-user can simply apply various services from self service portal

Automatic provision and configuration at end-user’s requirement

End-user can add new services without upgrading their hardware assets

- **Customer Self-Service Portal**
- **Converged E2E Orchestration**
- **vNAS**
- **VoD**
- **IPTV**
- **vCPE**
- **Extended Home LAN**
- **Virtualized Cloud Infrastructure**
- **DLNA Server**
- **Device A1**
- **Device A2**
- **Device B1**
- **Device B2**
- **Home A**
- **Home B**
- **L2 CPE**
- **Access/Aggregation**
- **Internet**

vNAS and DLNA becomes available immediately

Residential vCPE – Per Device Policy Management -

**Personalized service**

End user can use various services from self-service portal simply and quickly

Automatic provision and configuration through end user requirement

Parental Control is available anytime from service portal

- **Customer Self-Service Portal**
- **Converged E2E Orchestration**
- **vCPE**
- **L2 CPE**
- **Home A**
- **Home B**
- **Device A1**
- **Device A2**
- **Device B1**
- **Device B2**
- **Internet**
- **Parental Control**
- **FW**
- **Anti-virus**
- **Various appliances**

Provision for each device
[Reference] Enterprise vCPE

**Enterprise**: Reduce costs for IT/NW equipment and maintenances

**Telecom Carrier**: Expand their business for enterprises

![Diagram of network architecture with vCPE](https://example.com/diagram.png)

NEC SDN Partner Space

**NEC SDN Partner Space is an open SDN application ecosystem**

- NEC realizes various services

![Diagram of SDN Partner Space ecosystem](https://example.com/diagram.png)
NFV Open Ecosystem

NEC NFV solutions fully comply ETSI NFV standard. Each component provides open interfaces.

Source: ETSI GF NFV 002 v1.1.1 (2013-10)