

## Redesigning the High Tech Campus Eindhoven



Home to many of the world’s most innovative companies, the High Tech Campus Eindhoven has created an ‘open’ research environment – using network virtualisation features to partition the campus IP network into multiple segments and introduce new intelligent services. A future blueprint for global R&D collaboration, this new model is helping the next wave of pioneers to speed innovation to market.

### Business Challenge

Founded in 1999 by Royal Philips Electronics of the Netherlands, the High Tech Campus Eindhoven provides state-of-the-art research and development (R&D) facilities to many of the world’s leading high-tech organisations and pioneering start-up companies. The Campus continues to support Philips renowned R&D activities that created world-standard formats like DVD and CD. The organisation is also responsible for IT and facilities management and the letting of the buildings.

The extensive research facilities represent a total investment to date of some €600 million and are separated into five technology domains – Microsystems, Life-Tech, High-Tech Systems, Infotainment and Embedded Systems. The 22-acre site includes around 30 buildings – a combination of clean rooms, laboratories and offices – that are an international home to more than 5,000 people and 50 different nationalities.

Similar to the dynamic markets that it serves, the R&D landscape is itself undergoing huge change. The speed of that change is glimpsed by Moore’s laws<sup>1</sup> of technology advancement, which originally identified the doubling of the number of transistors on integrated circuits every 18 months.

<sup>1</sup> [http://en.wikipedia.org/wiki/Moore's\\_law](http://en.wikipedia.org/wiki/Moore's_law)

### Executive Summary

#### Organisation Name

- High Tech Campus Eindhoven

#### Industry

- Research and Development (R&D)

#### Business Challenge

- Founded by Philips in 1999, the Campus wanted to create an environment that allows the leading high-tech organisations residing on the site to improve collaboration and conduct research more efficiently and effectively
- Simplify management of IT and Facilities
- Improve the use and availability of campus resources
- Reduce operating costs

#### Solution

A Service-Oriented Network Architecture (SONA) has introduced new virtualisation features that enable the network to be partitioned into many logical networks to create an ‘open’ research. Cisco SONA interactive services include:

- Voice and Collaboration Services
- Mobility Services
- Security Services

#### Business Results

- ‘Pay-as-you-go’ services and cost sharing has stimulated innovation – making R&D more accessible to more companies, irrespective of size
- New IT model and architecture can be extended to create a virtual campus around the globe – removing the barriers of time and physical location
- Positive impact to R&D projects – reducing timeframes and allowing companies to bring innovation to market faster and in a more cost-effective way

“We have created an open research environment that will deliver positive impact to R&D by reducing project timeframes and allowing our customers – many of the world’s leading high-tech companies – to bring innovation to market faster and in a more cost-effective way. Accelerating these advancements will ultimately benefit industry, consumers, the general public and the wider world.”

Patrick Stemkens  
Chief Information Officer  
High Tech Campus Eindhoven

While these principles still hold true today, recent advancements are having to be achieved in much shorter timeframes – to meet the enterprise needs for flexibility and collaboration with multiple partners, in order to reduce time to market (TTM) and efficiently combat threats in a global competitive environment. Against this backdrop, the High Tech Campus Eindhoven’s vision was to create an ‘open’ research environment that would better meet these strategic business challenges.

### Solutions

The foundation for making this transformation was to optimise the existing campus infrastructure with a more integrated and responsive architecture that utilised the advantages of intelligence within the network.

Working closely with Cisco Systems, a project was launched to develop a new IP model and future blueprint for R&D – based on the introduction of a Service-Oriented Network Architecture (SONA).

SONA is an architectural framework in which the intelligent network forms a common, single element that connects and enables all components of an IT infrastructure – including clients, servers and storage – to accelerate applications, optimise processes and maximise IT resource.

By focusing on the interactive services layer – the link between the networked infrastructure (of clients, servers and storage) and the applications layer – Cisco SONA allows the campus to enable the infrastructure to enhance collaboration tools and business applications.

In addition to providing integrated support to existing IP telephony, IP TV, data and mobile communications across the site, it is the new capabilities embodied in the SONA framework – such as virtual routing and forwarding (VRF) and virtual fire walling – and the way this allows intelligent services to be run over the infrastructure that has really helped to transform the High Tech Campus Eindhoven.

This has enabled the Campus to meet the following strategic business challenges:

- Improve operational efficiency and better support the needs of multi-tenants by introducing virtualisation features that enable the network to be partitioned into many logical networks
- Create new service models that provide services on a more cost-effective basis to customers, including start-up companies with limited research budgets
- Improve access to research resources and equipment, and, in doing so, increase use and asset value

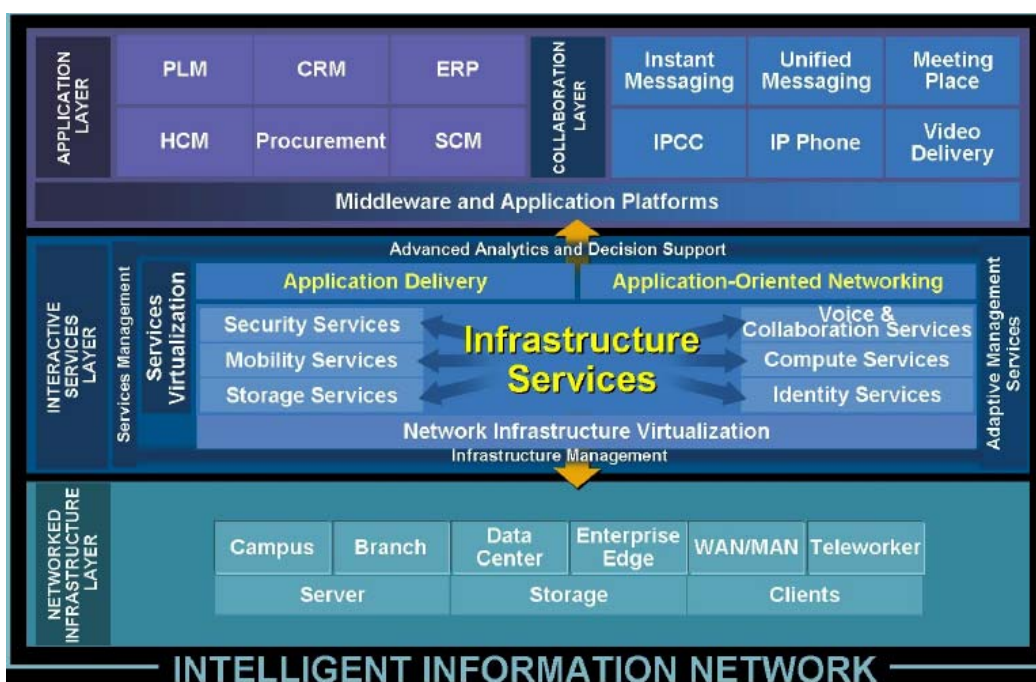


Figure 1 Cisco Service-Oriented Network Architecture (SONA) Framework

- Deliver business transformation and a collaborative research environment where companies can conduct research together, share learning and exchange information more easily

### Business Results

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“Accelerating these advancements will ultimately benefit industry, consumers, the general public and the wider world.”

### Improving Operational Efficiency

In the past the dual core network had to be physically built out to accommodate new project teams taking space on the campus. At the end of the project this switching equipment and cabling had to be recovered. Then there was the issue of having to deal with moves, adds and changes (MAC), which over a typical 12-month period could result in as many as 2,000 additional requests to manage.

Under the new agile model, instead of replacing hardware the campus IT team can now create a virtual network environment – through fast, simple and centralised software configurations – that securely connects a company, or number of companies at the same time, to microscopes and other research tools and devices located in designated clean rooms and laboratories. These same resources can be easily isolated, switched and re-used for other R&D projects.



### Creating New Service Models

The new virtual environment has enabled the introduction of shared services and cost sharing. Cost sharing is particularly relevant in terms of helping to stimulate the next wave of pioneers. Peter Linssen, IT Manager at High Tech Campus Eindhoven, explains: “The new architecture framework provided by SONA has made a massive difference – particularly in terms of putting research within reach of start-up companies, many of which are the spark for many great ideas. By integrating SONA into our business model we can now offer flexible ‘pay as you go’ R&D services to our customers on the campus.”

The difference is best illustrated by a recent project. A small company on the campus wanted to hire HDTV facilities to test the quality of digital ‘fingerprints’ that are being created to protect against illegal copying.

Before, the prospect of purchasing expensive projection and editing equipment for a short amount of time – with relatively limited budgets – would have been prohibitive. Instead the new environment has allowed shared access to the equipment, when it was needed, at a fraction of the cost. Not only that, but the company was able to benefit from additional HDTV expertise, patent information, component data and other research tools from Philips.

### Unlocking Value

The old inflexible network environment also under utilised key research resources – such as electronic microscopes and MRI scanners – which had to be hired in advance over a set period with no means of providing virtual firewall access to other project teams.

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Now, shared access can also be extended to general campus applications, while ensuring that they are kept separate from other business applications, such as ERP, and new software developments that are continuously being created as part of research projects.

Peter Linssen explains: “The Cisco solution has enabled us to adapt our existing IP infrastructure to deliver new services to a multi-tenant environment, without the need for an extensive network redesign. This is important because it allows us to meet our future challenges, lower total cost of ownership and maximise our assets by making better use of research resources, such as equipment and labs.”

### **Next Steps**

Looking ahead, the Campus is considering the feasibility of extending the model to create a virtual campus around the world – removing the barriers of time and physical location to connect with other research groups, universities and academic centres of excellence.

The new architecture also provides a roadmap to introduce virtualised storage services, should the Campus decide in the future to migrate from its Network-Attached Storage (NAS) infrastructure and current data centre design.



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## Technology Blueprint

The Campus network is based on the Cisco Service-Oriented Network Architecture (SONA). This architectural framework offers a path to migration. It allows the enterprise to pragmatically implement the intelligent information network vision to transform an existing infrastructure – with all its interconnected components – into a single, integrated system that unites disparate networks, applications and databases.

The architecture supports both layer 2 and layer 3 services (including around 700 existing virtual LANs for common facility and security management services). Interactive services supported include:

### Voice and Collaboration Services

The Unified Communications solution includes six Cisco Catalyst 6500 Series Switches in the core, which deliver Gigabit Ethernet traffic – a mixture of IP telephony, IP TV and data applications – across the site.

### Mobility Services

The switching platform is also fully integrated with the campus wireless LAN (WLAN) and enables mobile users to connect to the network via 450 public area access points.

### Security Services

The new virtualized capabilities are embodied in the SONA framework. Virtual routing and forwarding (VRF) and virtual fire walling allow intelligent security services to be run over the infrastructure.

The switching platform is fully integrated with the Campus wireless LAN (WLAN) and allows mobile users to connect – via Cisco Aironet 1100 and 1200 Series Access Points – to campus network services. The Cisco Wireless LAN Solution Engine (WLSE) provides centralised management of the access points and wireless environment. Security is built into each component and enhanced by Cisco Firewall Services Modules (FWSM) using latest Cisco PIX technology.



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