

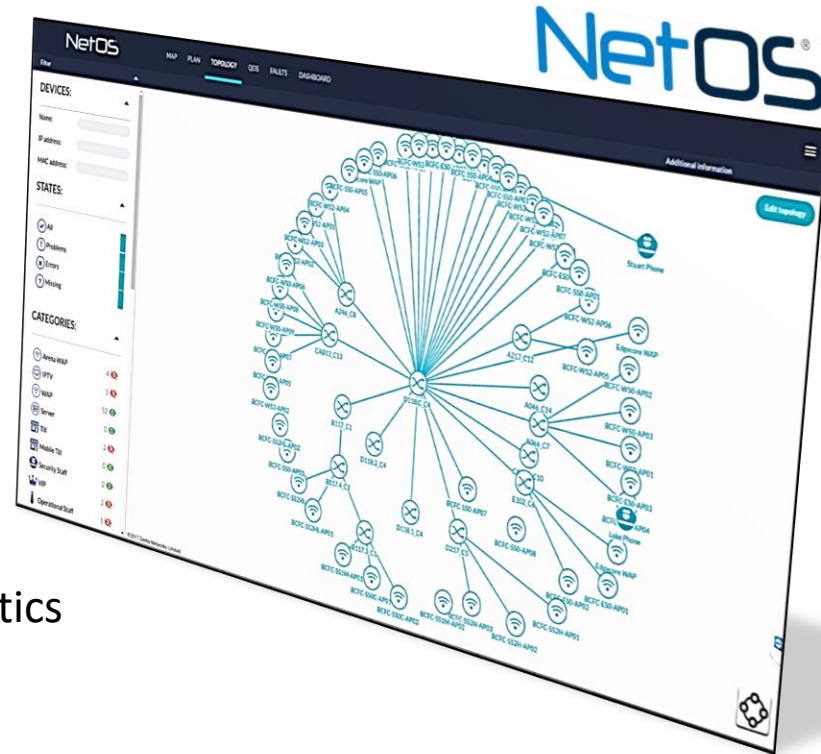
Enabling Superior Networks

Vassilis Seferidis



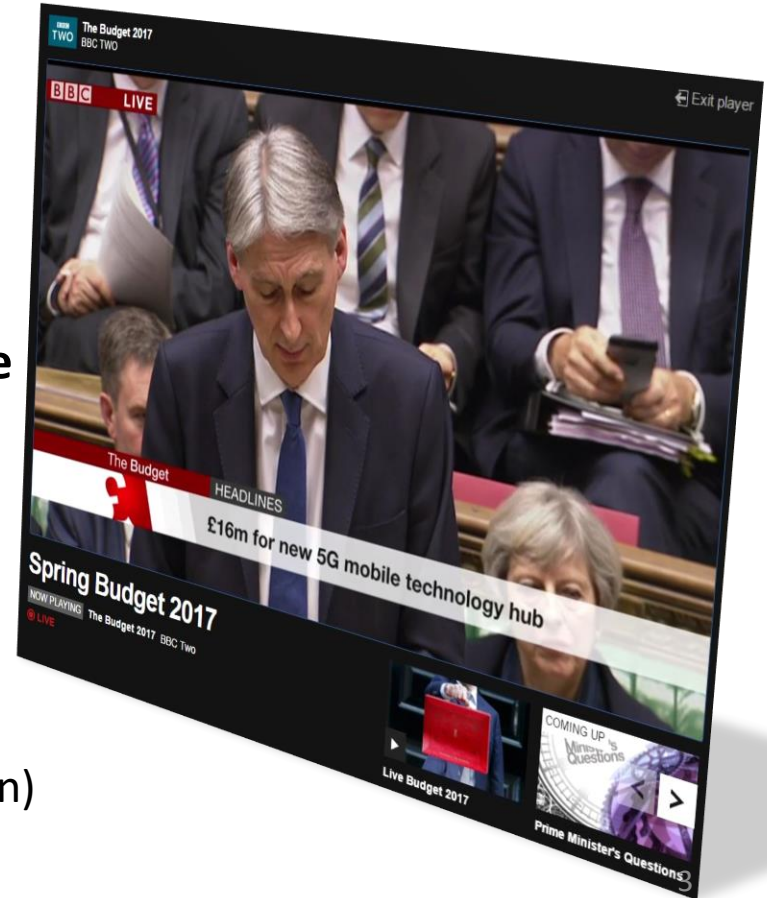
Agenda

- Company Introduction
- What is NetOS®?
- What it can do?
- Features and Benefits
- Ashton Gate Stadium Deployment
 - Simplify Network Management
 - Prioritize Users, Devices or Apps
 - Better Monetisation of infrastructure
 - New revenue opportunities via Data Analytics
- Conclusions



Company Overview

- **Unique (patent-protected) Technology:**
 - **Network Splicing & Slicing**
- £3.0m VC investment
- £1.8m Innovate UK Contract
- **£1.2m DCMS 5G Testbeds & Trials Programme**
 - 5G-Tourism (Bristol & Bath, WECA)
 - 5G-RuralFirst (Scotland, Cisco)
- **Horizon2020 Projects**
 - REPLICATE (€25m Smart Cities project)
 - 5G-PICTURE (Cloud/Network orchestration)
 - METRO-HAUL (Multi-domain/vendor orchestration)



NetOS® Splicing: Unified Control of all Sub-systems



Network Slicing: Dedicated Pipes of Connectivity

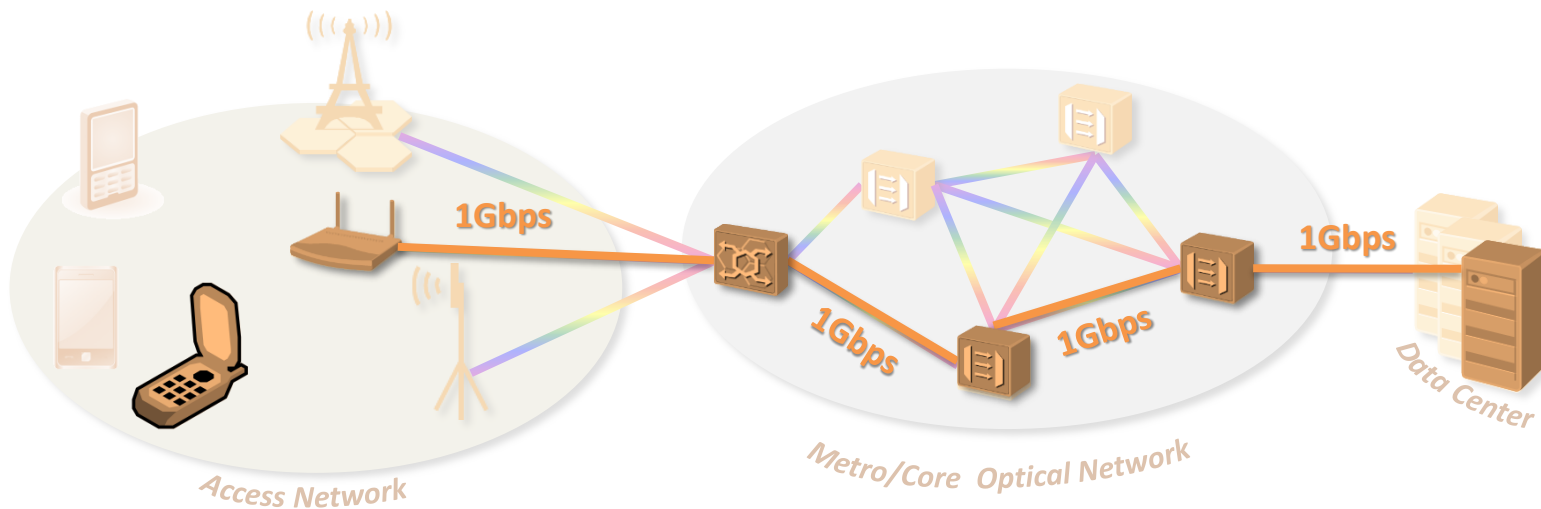
NetOS®

Virtualization

Network Abstraction

DataCenter Orchestration

Create on-demand 'network slices' with guaranteed QoS & full control



Our NetOS[®] solution and value proposition

Value Proposition

1. Software Solution (H/W agnostic)
 2. Dynamically managing priorities of Users, Devices & Apps
- More efficient & flexible utilisation of network resources
 - New revenue opportunities

Categorise and Personalise



NetOS®

zeetta
NETWORKS

Ashton Gate Stadium
*A NetOS® **Smart Venue** Deployment*



Ashton Gate Stadium



- Renovate existing stadium
 - \$70m investment
 - Largest venue in South West
 - 30,000 person capacity
 - More than a Sports Venue!



Vision

“ Our vision is to have an orchestrator of our network whereby bandwidth can be moved instantly from requirement to requirement in real time round the Aston Gate Stadium from a central control centre without the need to reset routers and switches ...”

Martin Griffiths, Chairman, Bristol Sport

Project Overview

- New Installed Infrastructure

- ✓ **Arena Wi-Fi**

- 99 Ruckus Access Points*

- ✓ **Hospitality Wi-Fi**

- 53 Edgecore Access Points*

- ✓ **12 Switches**

- 2 Access controllers*

- 5.5km of cable*

- 1km fibre optic*

- ✓ **Firewall WG Firebox M4600**

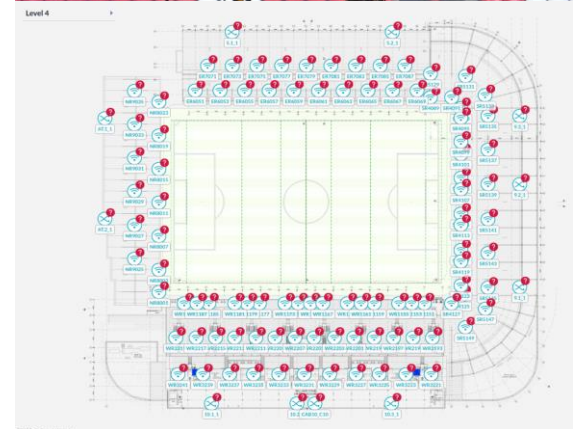


- NetOS® Installation

- ✓ **Monitoring all connected sub-systems**

- Tills, IPTV, CCTV, Turnstiles, ...*

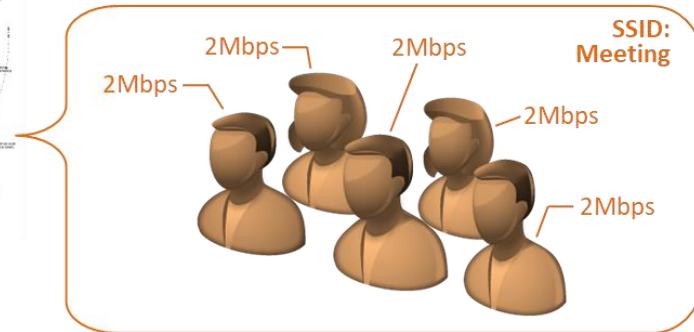
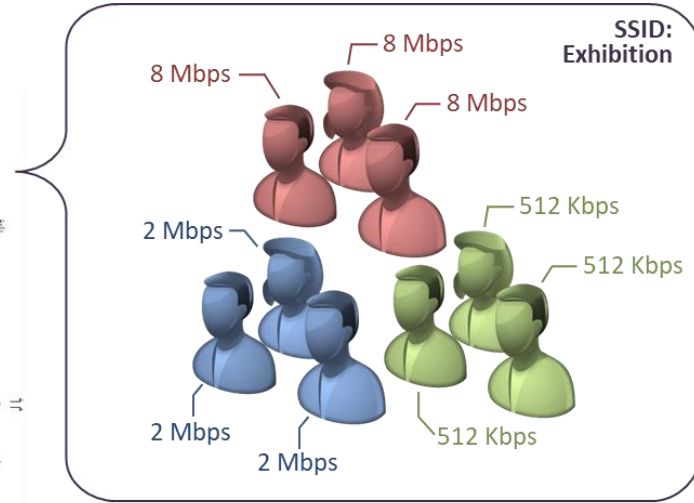
- ✓ **Dynamic management of VLANs**



Companies Involved



Network Slicing in a Venue (e.g. Stadium)



NetOS[®] Benefits via Apps

NetOS[®] Apps running on Ashton Gate Stadium network

Network Monitoring & Fault Finding

Visibility of all
sub-system
networks for
easier
troubleshooting

Easy Provisioning of New Services

Provide bespoke
connectivity
profiles to
different groups
or locations

Managing priorities of Users/Devices/Apps

Dynamically
modify
connectivity rules
according to
external events or
situations

Monetisation & Data Analytics

1. Enable many
service providers
on the same
network
2. Data analytics
platform

NetOS® in Ashton Gate Stadium

Topology View

Network Monitoring
& Fault Finding

Visibility of all
sub-system
networks for
easier
troubleshooting

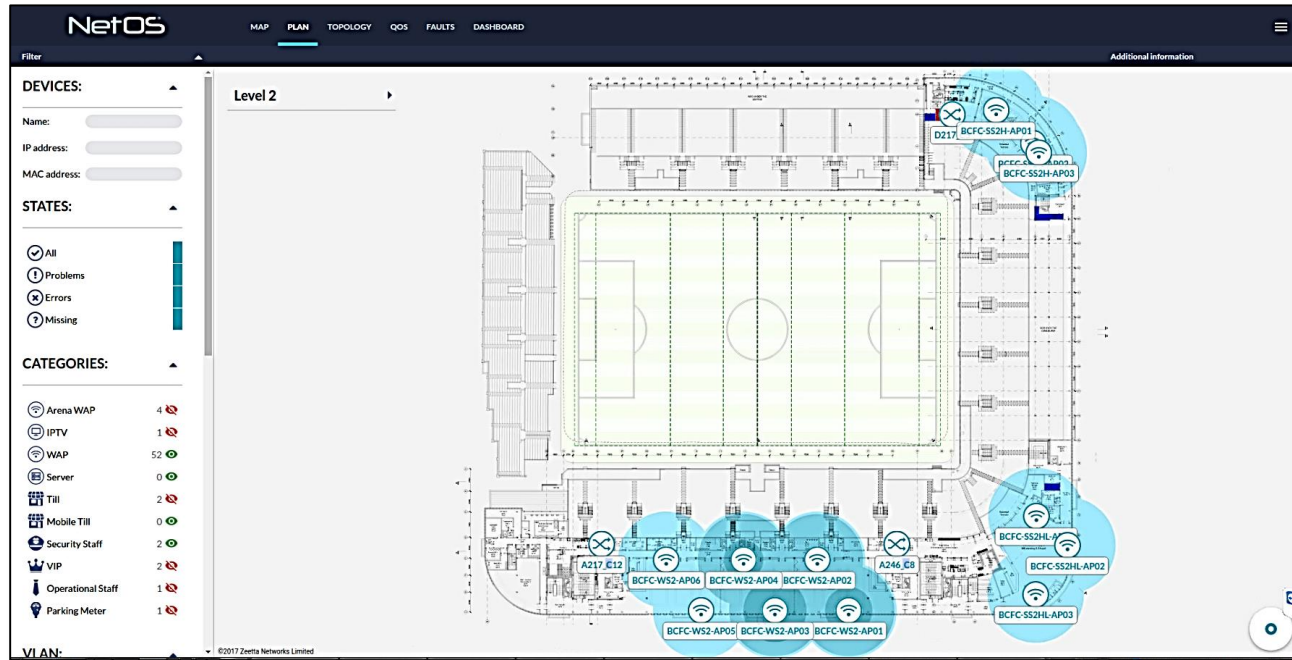


NetOS® in Ashton Gate Stadium

Floor-Plan View

Network Monitoring
& Fault Finding

Visibility of all
sub-system
networks for
easier
troubleshooting



NetOS[®] in Ashton Gate Stadium

Deviations from expected configuration

Network Monitoring
& Fault Finding

Visibility of all
sub-system
networks for
easier
troubleshooting

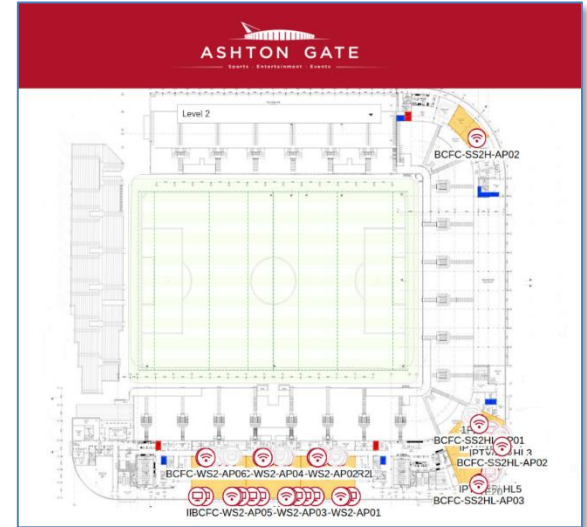
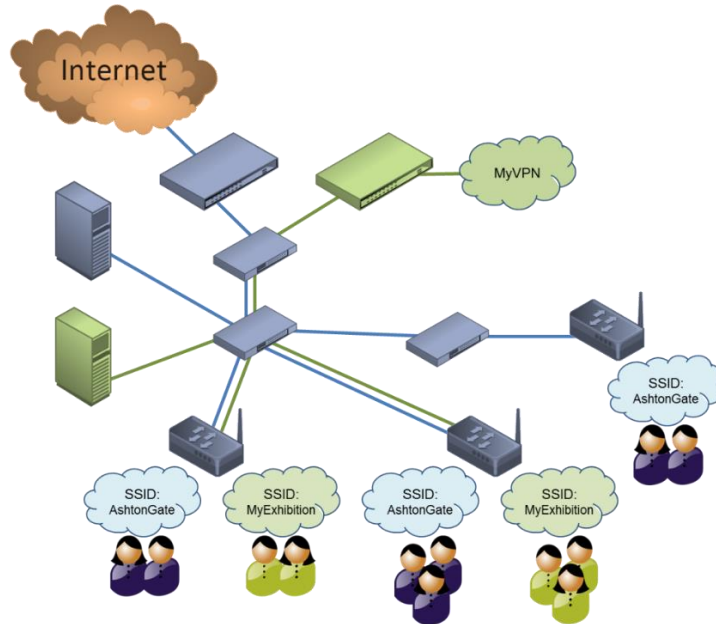
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Unexpected	Link		BCFC-WS2-AP05 -> A217_C12	host:cc:37:ab:d4:80:10 -> openflow:2218729868476	Accept	View on topology
Missing	Link		D118.C_C4 -> BCFC-SS0-AP03	openflow:2218729747129 -> host:cc:37:ab:d4:71:a0	Accept	View on topology
Missing	Link		D217_C5 -> BCFC-SS2H-AP03	openflow:2218729743698 -> host:cc:37:ab:d4:7b:30	Accept	View on topology
Missing	Link		BCFC-SS0-AP07 -> D118.C_C4	host:cc:37:ab:df:5e:b0 -> openflow:2218729747129	Accept	View on topology
Unexpected	Link		BCFC-SS2HL-AP01 -> CAB13_C13	host:cc:37:ab:d4:7a:70 -> openflow:2218729824717	Accept	View on topology
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Missing	Link		BCFC-SS0-AP03 -> D118.C_C4	host:cc:37:ab:d4:71:a0 -> openflow:2218729747129	Accept	View on topology

NetOS® Benefits via Apps

Deliver Bespoke 'Branded' Wi-Fi Hotspots to Event Organisers

Easy Provisioning of
New Services

Provide bespoke
connectivity
profiles to
different groups
or locations



NetOS® Benefits via Apps

Dynamically Reconfigure Network Resources

Managing priorities of
Users/Devices/Apps

Dynamically
modify
connectivity rules
according to
external events or
situations

Configuration 1



Universal Wi-Fi
internet access to all
spectators



Configuration 2



Security
personnel
access only

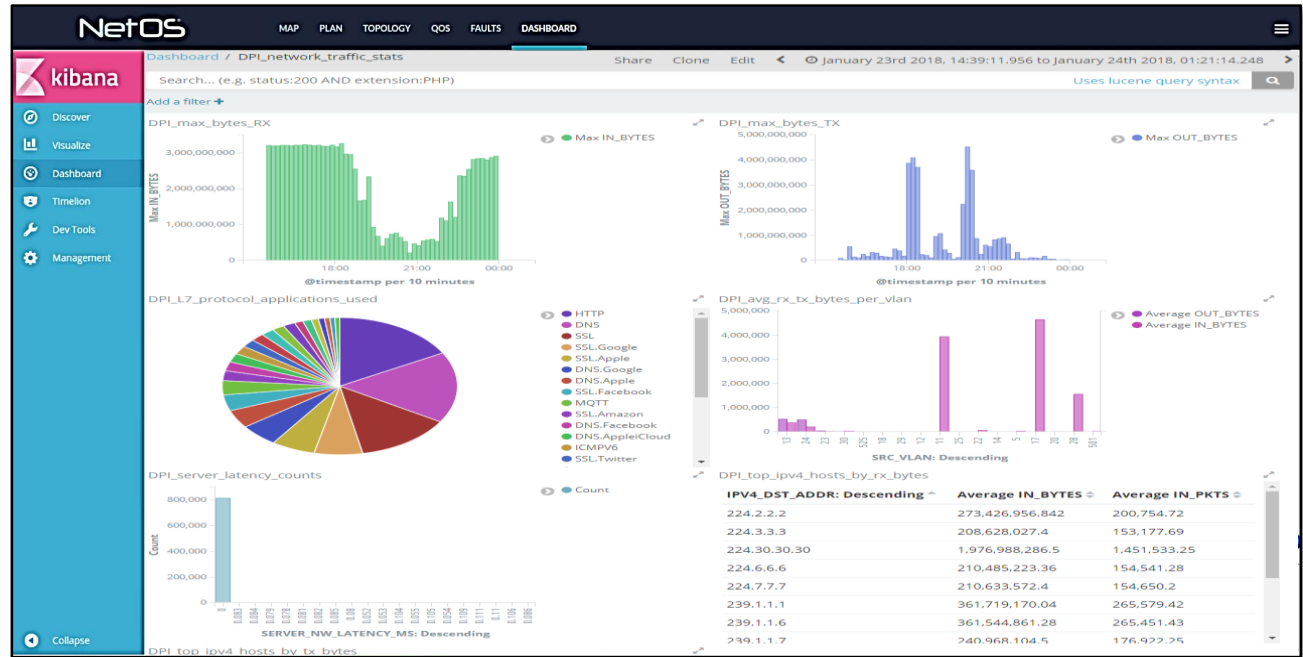
NetOS® in Ashton Gate Stadium

Data Dashboard

Monetisation & Data Analytics

1. Enable many service providers on the same network

2. Data analytics platform



Conclusions

- NetOS® = Infrastructure Operating System
- Enables:
 - Unification of disperse networks (**Splicing**)
 - Construct virtual sub-networks (**Slicing**)
- Benefits
 - Simplify network operations
 - Managing priorities of Users, Devices & Apps
 - More flexible monetisation of network infrastructure
 - New revenue opportunities via Data Analytics





Thank You!

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