

**X ALEF**



# F5 – Technical overview

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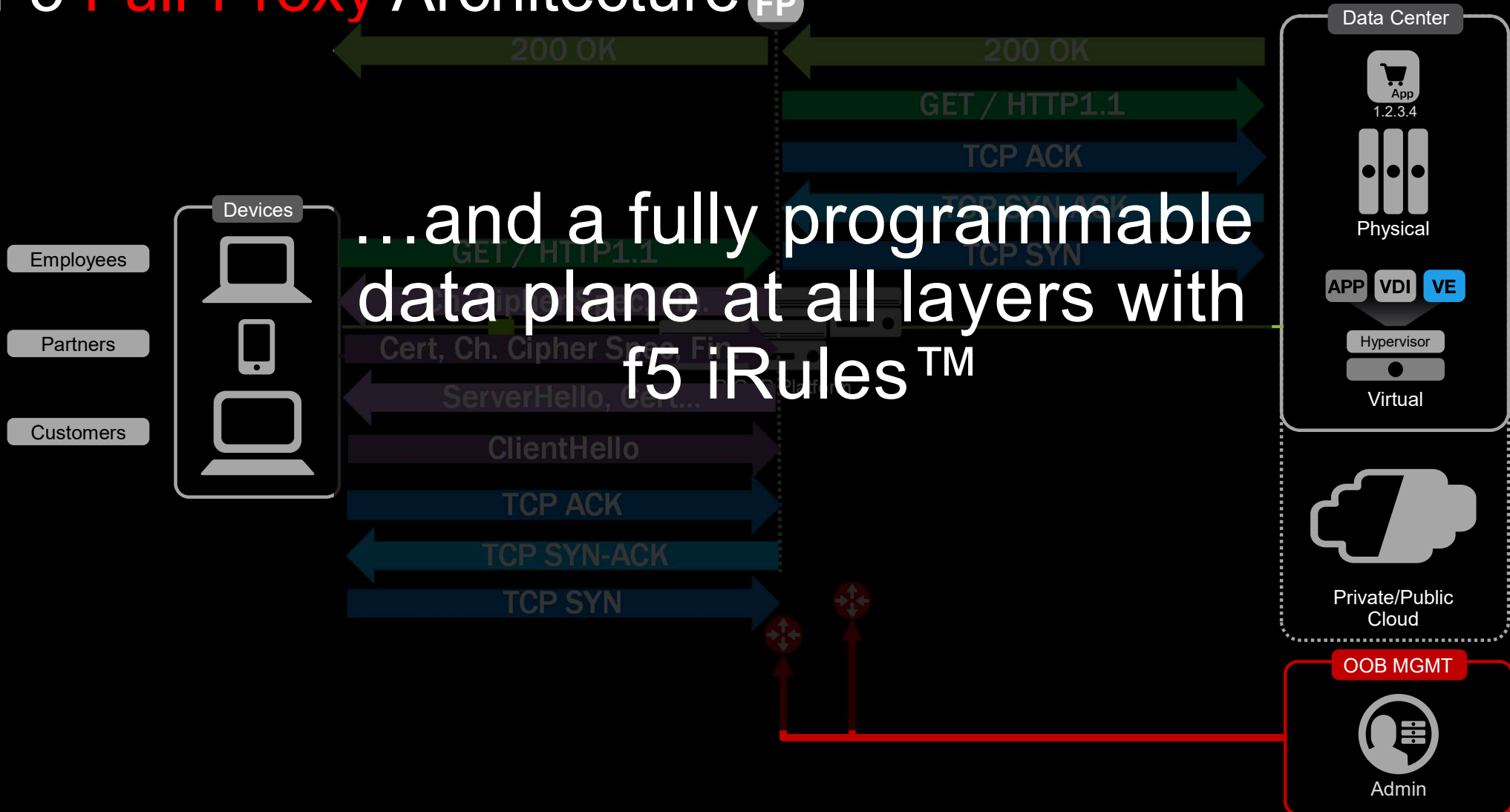
Roman Tomasek

# FULL-PROXY

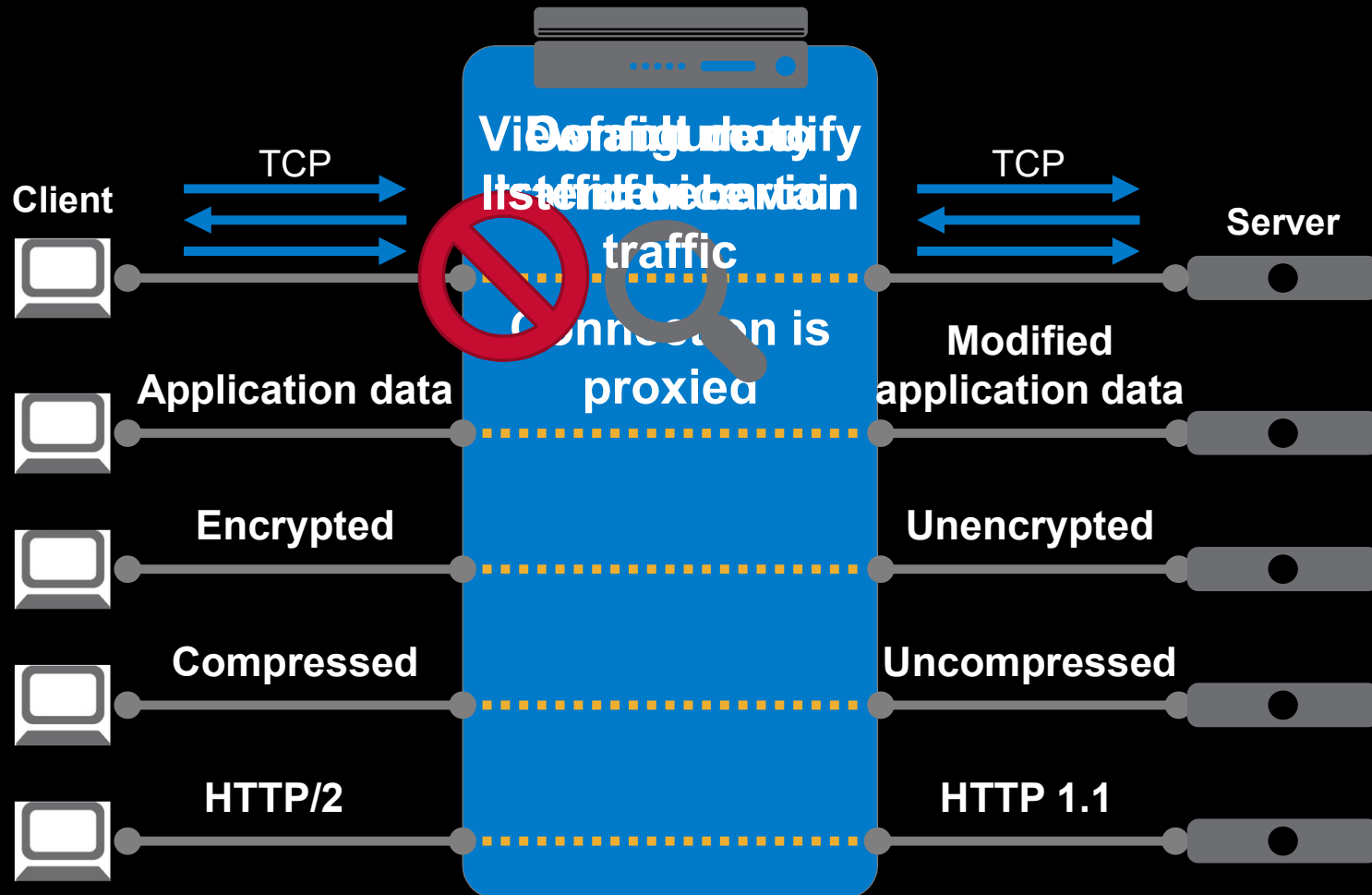
(The world's first full-proxy, run-to-completion, traffic-management microkernel)



# F5 Full-Proxy Architecture FP



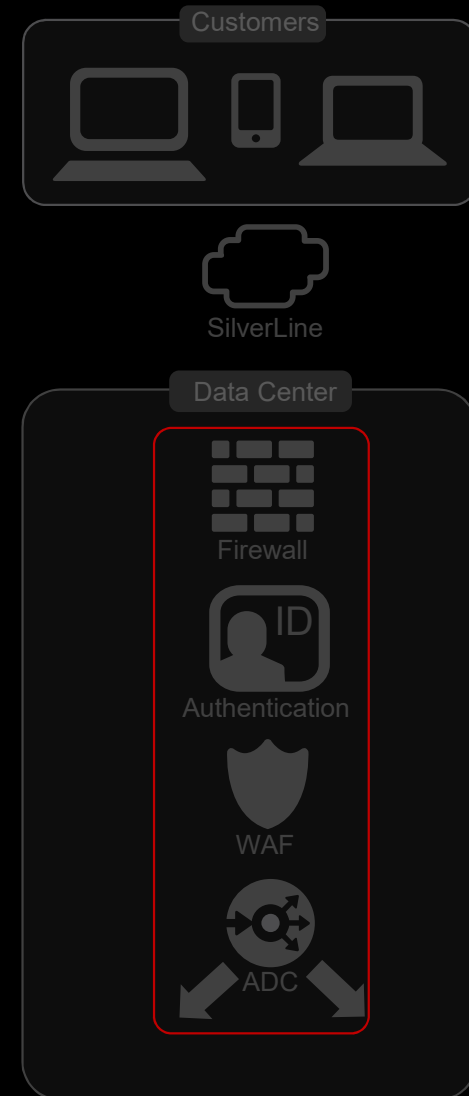
# BIG-IP Full Proxy Architecture



# F5 Platforms

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Physical, Virtual, Hybrid



# New BIG-IP iSeries **Hardware Platforms**

## World's Most Programmable Cloud-Ready ADC

DevOps like agility with the scale, security depth, and investment protection needed for both established and emerging apps



# BIG-IP Platform Generations

2004	2008	2012	2016
1500 v9.0.0 – v10.2.4	1600 v9.4.5 –	2000s 2200s v11.2.1 -	i2600 i2800 v12.1.2 -
3400 v9.0.0 – v10.2.4	3600 v9.4.5 –	4000s 4200v v11.2.1 -	i4600 i4800 v12.1.2 -
6400 v9.0.0 – v11.1.0	3900 v9.4.8 –	5050s 5250v v11.4.0 -	i5600 i5800 v12.1.2 -
6800 v9.0.4 – v11.1.0	6900 v9.4.6 –	7050s 7250v v11.4.0 -	i7600 i7800 v12.1.2 -
8400 8800 v9.4.0 – v11.1.0	8900 8950 v9.4.7 –	10050s 10250v v11.3.0 -	i10600 i10800 v12.1.2 -
	11000 11050 v11.0.0 –	10350v v11.5.4 –	i10800 v12.1.2 -

Major Release and Long-Term Stability Release versions	First customer ship	End of Software Development	End of Technical Support	Latest maintenance release
15.1.x	December 11, 2019	December 11, 2024	December 11, 2024	15.1.0
15.0.x	May 23, 2019	August 23, 2020	August 23, 2020	15.0.1
14.1.x	December 11, 2018	December 11, 2023	December 11, 2023	14.1.2
13.1.x	December 19, 2017	December 19, 2022	December 19, 2023	13.1.3
12.1.x	May 18, 2016	May 18, 2021	May 18, 2022	12.1.5
11.6.x	May 10, 2016 <sup>1</sup>	May 10, 2021	May 10, 2022	11.6.5

Software compatibility matrix: <https://support.f5.com/csp/#/article/K9476>

# Tick/Tock Release Model

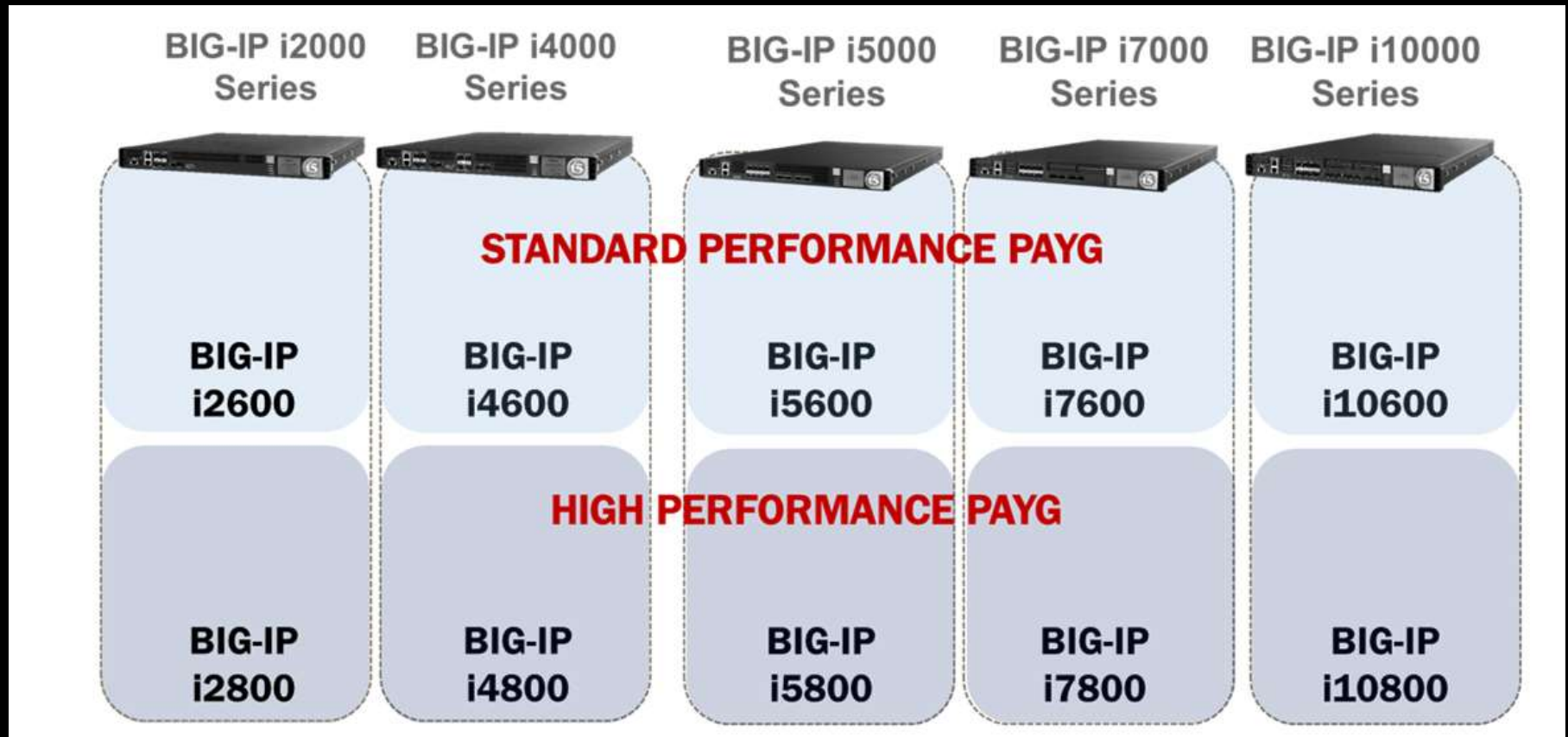
- New Major Release each year. (2015 – v12, 2016 – v13, 2017 - v14)
- Tick: N.0.0 / Tock: N.1.0
- Long Term Stability Release: N.1.1+
- Tick is major new architectural changes to TMOS. Supported for a maximum of 15 months
- Tock is an extension of themes introduced in Tick
- Tock will be feature frozen as the long term stability release. Supported for 5 years from first ship of Tick (N.1.0) and contains only:
  - hotfix rollups
  - new hardware support
  - diagnostic improvements



# F5 Tick –Tock Software Lifecycle Model Example



# Pay-as-you-Grow (PAYG) Product Names



# BIG-IP Platforms - What's New?

## BIG-IP i10800 (Compared to 10250v)



- 160/80 Gbps L4/L7 throughput **(2X)**
- 3.5M L7 RPS **(1.75X)**
- 100M concurrent conns **(2.8X)**
- 48K SSL ECC TPS **in HW**
- 16 vCMP guests **(1.3X)**

## BIG-IP i7800 (Compared to 7250v)

- 80/40 Gbps L4/L7 throughput **(2X)**
- 3M L7 RPS **(1.9X)**
- 80M concurrent conns **(3.3X)**
- 25K SSL ECC TPS **in HW**
- 12 vCMP guests **(1.5X)**

## BIG-IP i5800 (Compared to 5250v)

- 60/35 Gbps L4/L7 throughput **(2X)**
- 1.8M L7 RPS **(1.2X)**
- 40M concurrent conns **(1.7X)**
- 16K SSL ECC TPS **in HW**
- 8 vCMP guests

- ✓ F5-only TurboFlex optimization technology across lineup
- ✓ SSL ECC offload in latest crypto co-processor chipset
- ✓ 1RU across entire iSeries lineup
- ✓ 40G Ports (Only 10G in 7250v and 5250v)

- ✓ “80 Plus Platinum” certified power supplies for more efficient perf/watt
- ✓ 2.2” color touchscreen LCD
- ✓ Out of band hardware diagnostics (BMC with full IPMI support)

# BIG-IP Platforms - What's New?

## BIG-IP i4800

(Compared to 4200v)

- 20/20 Gbps L4/L7 throughput **(2X)**
- 1M L7 RPS **(1.2X)**
- 28M concurrent conns **(2.8X)**
- 10K SSL ECC TPS
- 20K SSL RSA 2K TPS **(2.2X)**

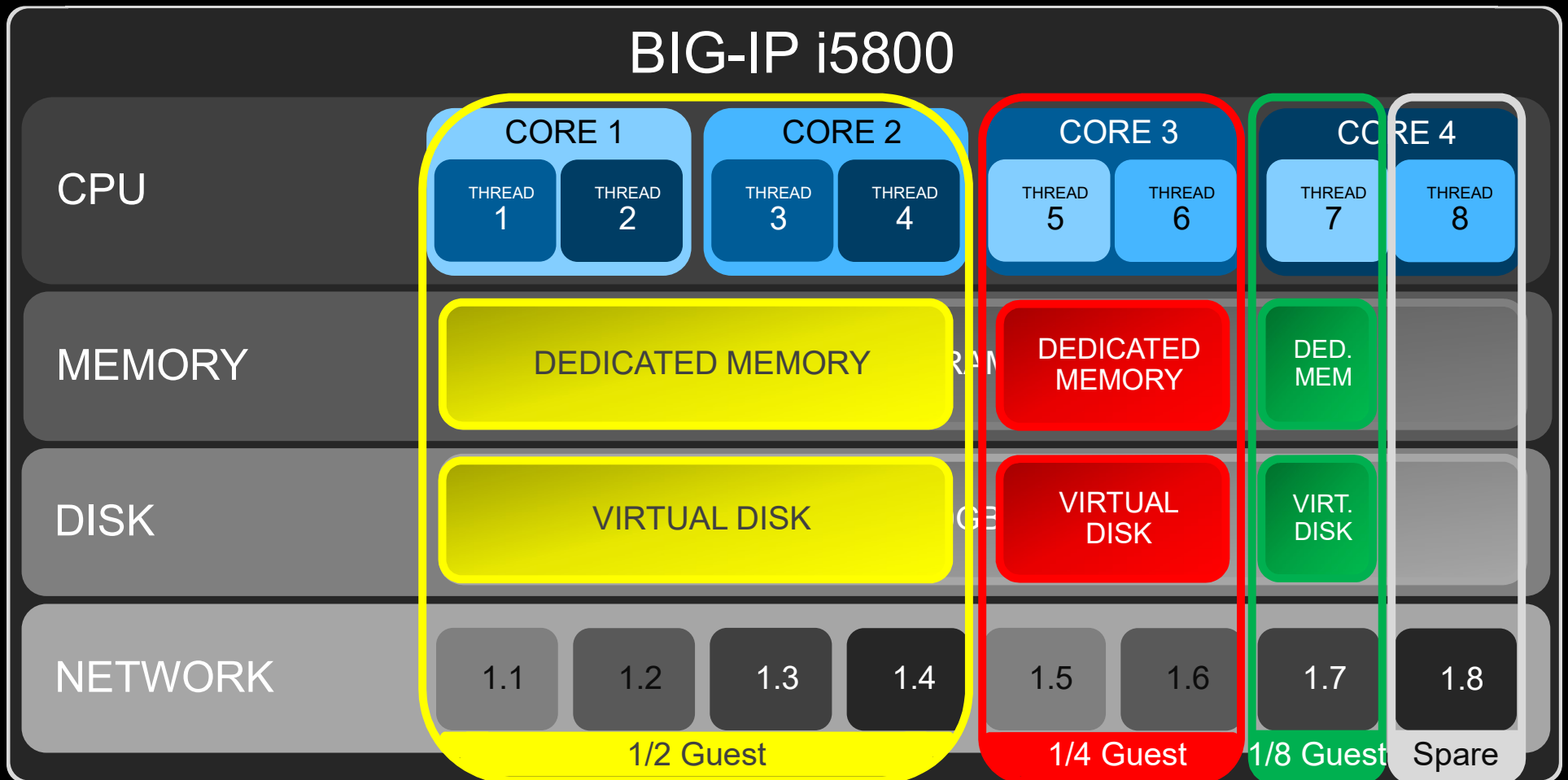
## BIG-IP i2800

(Compared to 2200s)

- 10/10 Gbps L4/L7 throughput **(2X)**
- 650K L7 RPS **(1.5X)**
- 14M concurrent conns **(2.8X)**
- 3.5K SSL ECC TPS
- 4.3K SSL RSA 2K TPS **(1.1X)**

- ✓ F5-only TurboFlex optimization technology (No FPGAs in previous generation)
- ✓ 2.2" color touchscreen LCD
- ✓ Out of band hardware diagnostics (BMC with full IPMI support)

# Virtualisation on **Dedicated** F5 Hardware



# F5 Platform Options

LTM

AFM

APM

ASM

FPS

DNS

CGNAT

AVR

PEM

SWG

LC

TMOS

VIRTUAL EDITION

STANDARD EDITION

PUBLIC  
CLOUD

(AWS, Azure)

PRIVATE  
CLOUD

(VMWare, Hyper-V)

vCMP

BIG-IP Platforms &  
VIPRION Chassis

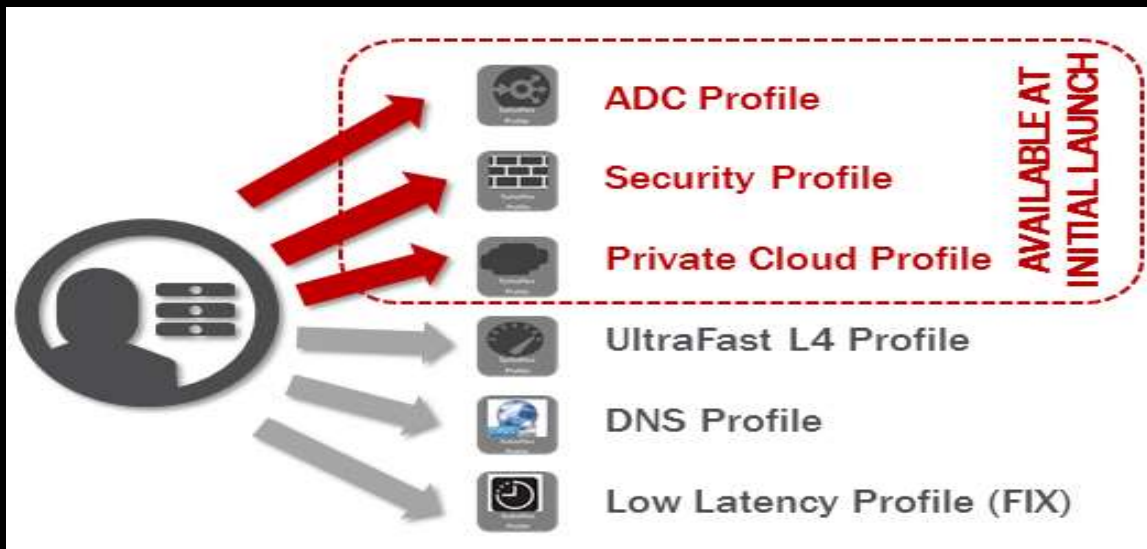
COMMODITY HARDWARE

F5 CUSTOM HARDWARE

# F5 Platform **Performance** Options

L4 Throughput	25Mbps	→	1.12 Tbps
L7 Throughput	25Mbps	→	1.12 Tbps
L7 RPS	75 K	→	40 M
SSL TPS (2048)	2 K	→	1.28 M
L4 CPS	550 K	→	23 M
L7 CPS	25 K	→	6.4 M
Max L4 Conns	5 M	→	1.4 B

# TurboFlex Profiles



## KEY BENEFITS

- ✓ First use-case-based FPGA solution fully integrating Hardware and Software design.
- ✓ Unmatched wirespeed performance for Private Cloud and Hybrid deployments.



# Understanding Turbo Flex

## TurboFlex is....

- Not a generic term to describe ePVA, Hardware offload/acceleration
  - **Only available on the ix800 models in iSeries**
  - Extensible to add features in future releases
- 
- ix600 models **do not have** TurboFlex
  - ix600 models do ***support a limited set*** of hardware acceleration (Base Profile) in FPGA
  - ***Base Profile*** on the ix600 models accelerates the following in hardware:
    - QinQ tunneling
    - ePVA TCPIPv4
    - Per VS SYN Cookies
    - NVGRE, VXLAN, EtherIP and IP in IP tunneling

# 3 Tiers based on FPGA capacity

**BIG-IP i2800**



**Tier 1**

# 3 Tiers based on FPGA capacity

**BIG-IP i2800**    **BIG-IP i4800**



**Tier 1**

**Tier 2**

# 3 Tiers based on FPGA capacity

**BIG-IP i2800**

**BIG-IP i4800**

**BIG-IP i5800**

**BIG-IP i7800**

**2x Bandwidth**

**BIG-IP i10800**



**Tier 1**

**Tier 2**

**Tier 3**

# No TurboFlex: i2600

i2600

Qin Q tunneling



NVGRE, VXLAN, Ether-IP and IPinIP tunneling



## TurboFlex: Tier 1 (i2800)

		i2800	
		ADC Profile	Private Cloud Profile
	Qin Q tunneling	•	•
	NVGRE, VXLAN, Ether-IP and IPinIP tunneling	•	•

## TurboFlex: Tier 1 (i2800)

	i2600	i2800		
		ADC Profile	Private Cloud Profile	Security Profile
Qin Q tunneling	●	●	●	●
NVGRE, VXLAN, Ether-IP and IPinIP tunneling	●	●	●	●
Basic DoS vectors	×	×	×	●
Advanced DoS vectors - SIP/ DNS	×	×	×	●

## No TurboFlex: i4600





## TurboFlex: Tier 2 (i4800)

		i4800	
		ADC Profile	Private Cloud Profile
Qin Q tunneling NVGRE, VXLAN, Ether-IP and IPinIP tunneling	i4600	•	•
		•	•

# TurboFlex: Tier 2 (i4800)

	i4600	i4800		
		ADC Profile	Private Cloud Profile	Security Profile
Qin Q tunneling	●	●	●	●
NVGRE, VXLAN, Ether-IP and IPinIP tunneling	●	●	●	●
Basic DoS vectors	×	×	×	●
Advanced DoS vectors - SIP/ DNS	×	×	×	●
Per VS DoS Vectors	×	×	×	●
Per Client White/ Gray/ Blacklisting	×	×	×	●

## No TurboFlex: (i5600 / i7600 / i10600)

i5600  
i7600  
i10600

Qin Q tunneling	•
NVGRE, VXLAN, Ether-IP and IPinIP tunneling	•
Per VS SYN cookies	•
ePVA - IPv4 (Fast L4)	•

# TurboFlex: Tier 3 (i5800 / i7800 / i10800)

	i5600 i7600 i10600	i5800 i7800 i10800	
		ADC Profile	Private Cloud Profile
Qin Q tunneling	●	●	●
NVGRE, VXLAN, Ether-IP and IPinIP tunneling	●	●	●
Per VS SYN cookies	●	●	●
ePVA - IPv4 (Fast L4)	●	●	●
ePVA - UDP	×	●	●
ePVA - IPv6	×	●	●

# TurboFlex: Tier 3 (i5800 / i7800 / i10800)

	i5600 i7600 i10600	i5800 i7800 i10800		
		ADC Profile	Private Cloud Profile	Security Profile
Qin Q tunneling	●	●	●	●
NVGRE, VXLAN, Ether-IP and IPinIP tunneling	●	●	●	●
Per VS SYN cookies	●	●	●	●
ePVA - IPv4 (Fast L4)	●	●	●	●
ePVA - UDP	✖	●	●	●
ePVA - IPv6	✖	●	●	●
Basic DoS vectors	✖	✖	✖	●
Advanced DoS vectors - SIP/ DNS	✖	✖	✖	●
Per VS DoS Vectors	✖	✖	✖	●
Per Client White/ Gray/ Blacklisting	✖	✖	✖	●

# Increased L7 Bandwidth Performance for iSeries – 15.1

## Customer Challenges

- Layer 7 throughput constraints can be a huge limiting factor for a customer's network traffic hence impacting application performance.

## F5 Solution

- With 15.1, F5 now offers double the current layer 7 bandwidth with TurboFlex profiles. This is valid for all x800 PAYG licenses for i5000, i7000, i10000, i11000, i15000
- Two new TurboFlex profiles options (turboflex-adc-v1 and turboflex-security-v1) - switch to the previous (L7/L4 balanced) FPGA firmware.



# Version Plus License Enforcement – VE – 15.1

- Starting with BIG-IP 11.4.1, you can purchase all BIG-IP VE SKUs with Version Plus licenses.
- Version Plus licenses enables you to use BIG-IP VE with perpetual usage. However, upgrades are limited to software versions within a pre-established range of software releases.
- BIG-IP v15.1.0 is the first release in which you might be impacted by existing Version Plus licenses.
- For example, if you are running with v12.x licenses, the licenses will not work after upgrade to v15.1.0.
- [K15643: BIG-IP VE license offerings](#).

SKU version	Supported BIG-IP release versions
V18	12.1.0 - 18.x.x
V16	11.6.0 - 16.x.x
V13	11.4.1 - 15.x.x
V12	11.4.1 - 14.x.x, 15.0.1 <sup>1</sup>

1A V12 SKU license can be activated and used in 15.0.1, but it will not run in subsequent versions of 15.x.x.



## F5 Hardware Lifecycle

- End of Sale at least 4 years after a new platform is first shipped (more often 5 or 6 years based on previous platforms).
- The BIG-IP 5250 was first shipped in March 2014, conservative dates for lifecycle would be:
  - Mar 2014 - First customer ship date.
  - Mar 2018 – Announce End of Sale (Estimated)
  - Mar 2019 – End of Sale
  - Mar 2021 – End of New Software Support (i.e. You can't install the latest/greatest software release).
  - Mar 2022 – End of Software Development (i.e. No more platform specific fixes).
  - Mar 2025 – End of Service Contract Renewal.
  - Mar 2026 – End of Technical Support and End of RMA.



# F5 Programmability



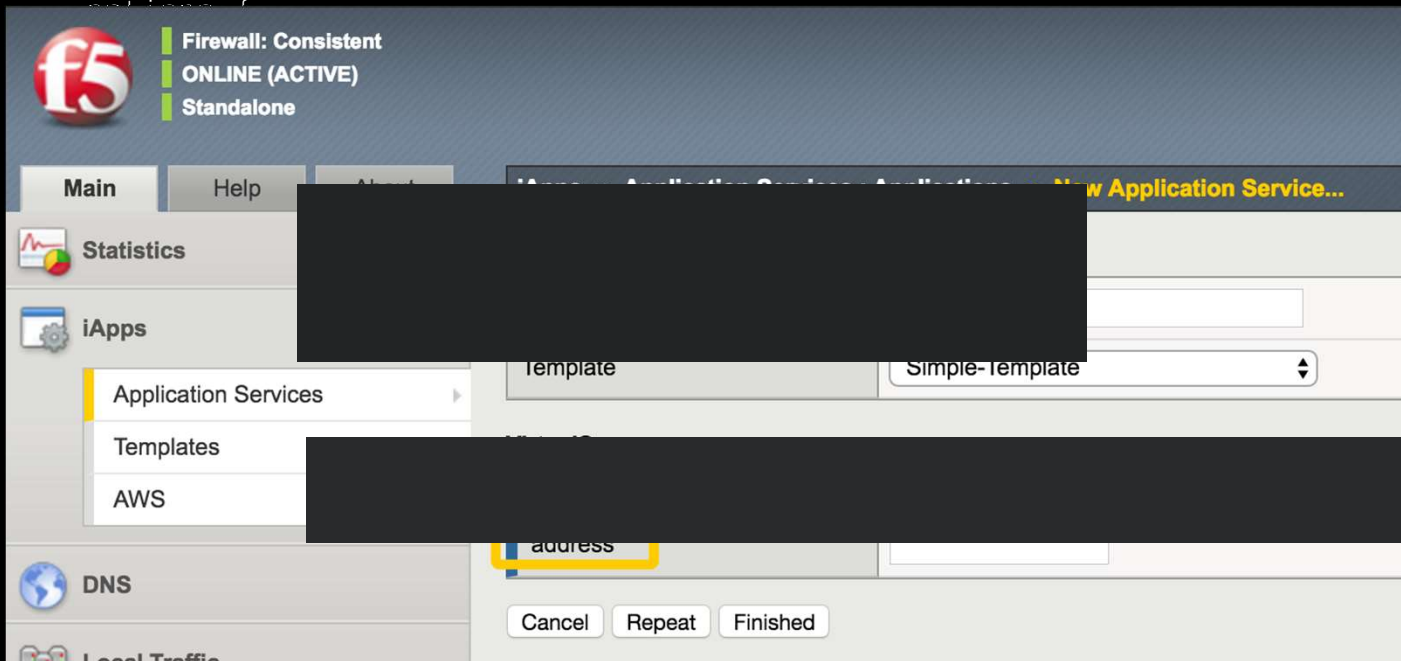
Scripted Control of the Data-Plane & MGMT-Plane

# iRules – Manipulating the **Data-Plane**

```
when CLIENTSSL_HANDSHAKE {  
  
    switch [SSL::cipher version] {  
  
        "SSLv3"      { set insecure 1 }  
        "TLSv1"      { set insecure 1 }  
        "TLSv1.1"    { set insecure 1 }  
        "TLSv1.2"    { set insecure 0 }  
        default      { set insecure 1 }  
    }  
}  
when HTTP_REQUEST priority 1 {  
  
    if {$insecure}{  
  
        HTTP::respond 302 Location "http://domain.com/advice" Content-Type text/html Expires /  
            "Mon, 1 Jan 2001 00:00:00 GMT" Cache-Control "no-cache, no-store, /  
            must-revalidate" Pragma "no-cache"  
        event disable all  
        TCP::close  
        return  
    }  
}
```

# iApps – Automating the **MGMT-Plane**

```
cli admin-partitions {  
  update-partition Common}sys application template /Common/iApp-Template {  
    update-partition {  
      update-partition {  
        update-partition {  
          update-partition {  
            update-partition {  
              update-partition {  
                update-partition {  
                  update-partition {  
                    update-partition {  
                      update-partition {  
                        update-partition {  
                          update-partition {  
                        }  
                      }  
                    }  
                  }  
                }  
              }  
            }  
          }  
        }  
      }  
    }  
  }  
}
```



# iControl – Orchestrating the **MGMT-Plane**

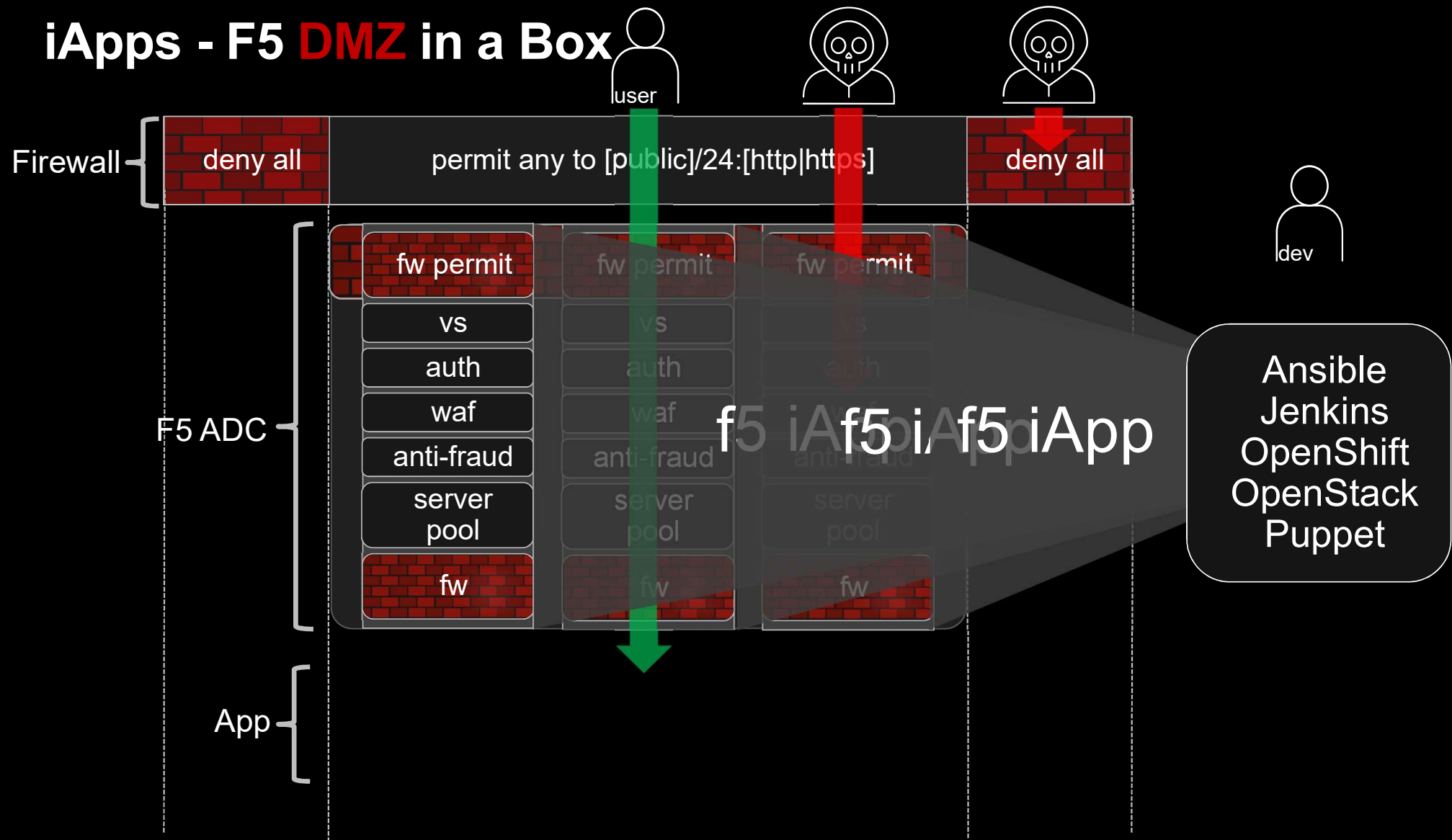
## CREATE iApp Service Using TMSH

```
tmsh create sys application service MyiApp template iApp-Template variables add vs__address { value 10.1.2.3 }
```

## CREATE iApp Service Using RESTful CURL.

```
curl -k -u admin:admin \  
-H "Content-Type: application/json" \  
-X POST https://localvm1.arch.com/mgmt/tm/sys/application/service \  
-d '{  
    "name": "MyiApp",  
    "partition": "Common",  
    "strictUpdates": "enabled",  
    "template": "/Common/iApp-Template",  
    "templateModified": "no",  
    "trafficGroup": "/Common/traffic-group-1",  
    "variables": [{  
        "encrypted": "no",  
        "name": "vs__address",  
        "value": "10.1.2.3"  
    }]  
}'
```

# iApps - F5 DMZ in a Box



# DevCentral. The F5 User Community. 1/4Million Members.

## REFERENCES

- Wikis
- API/SDK Documentation

## RESOURCES

- Sample Code
- Tech Tips
- Forums
- Podcasts
- Blogs

## TOOLS & FRAMEWORKS

- iRule Editor
- iControl SDK
  - .NET, Java, Python, Powershell, ...
- VMware vSphere Management Plug-in

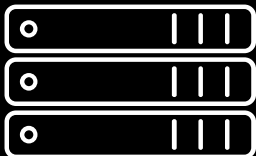
The screenshot shows the F5 DevCentral website. At the top is a navigation bar with the F5 logo, the text 'DevCentral', and links for 'Answers', 'Articles', 'Code', 'Resources', and 'About'. A search bar is located below the navigation bar. On the left side, there is an 'Explore:' section with a list of 'SOLUTIONS' (Security, Cloud, DevOps, App Delivery) and 'TECHNOLOGIES' (iApps, iCall, iControl, iControlREST, iRules, iWorkflow, LineRate, BIG-IP DNS, BIG-IP, Silverline, AWS, Azure, LTM, TMOS, TMSH, ASM, AFM). The main content area features a large article titled 'BIG-IP Upgrades Part 4 - Performing the Software' with a thumbnail image of a person on a roof. Below this are two smaller article snippets: 'Create a BIG-IP HA Pair in Azure' by Peter Silva and 'Lightboard Lessons: BIG-IP Cookie Persistence Values' by John Wagnon. On the right side, there is a user profile for 'Stephen Archer' with statistics (Level: Newbie, DevPoints: 0, Badges: 0, Messages: 0, Notifications: 0) and a section titled 'ANSWERS / DISCUSSION' showing a list of recent questions and answers.

# F5 Management



Public, private and hybrid cloud solutions

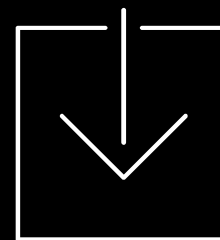
# BIG-IQ Device **Management**



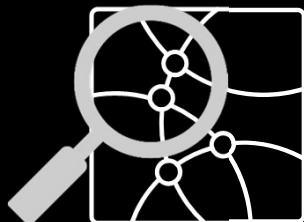
**Catalog and Inventory up to 400  
BIG-IP devices**



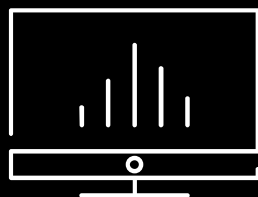
**Backup and restore images,  
config and snapshots**



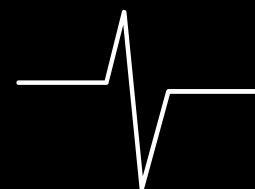
**Upgrade devices with  
Upgrade advisor  
and pre/post Checks**



**Cluster and  
Sync Group Visibility**



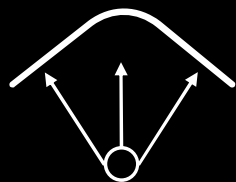
**Group Devices**



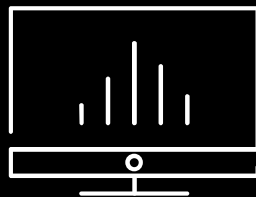
**iHealth integration  
(aggregated and  
searchable)**



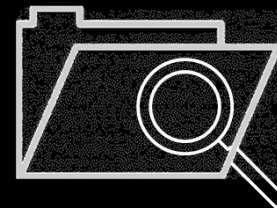
# BIG-IQ Security **Management**



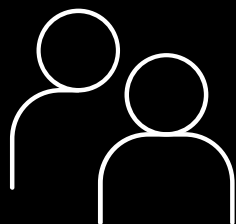
**Centralized Security Policies –  
across Data Centers  
across Clouds**



**Unified Security Dashboards  
Reports and Alerts**



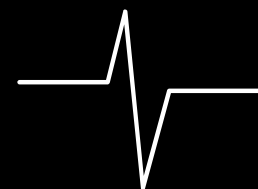
**Improve Compliance  
with Enterprise-Wide  
Audit Trails**



**Role-Based Management**



**Manage and Distribute  
Signatures**



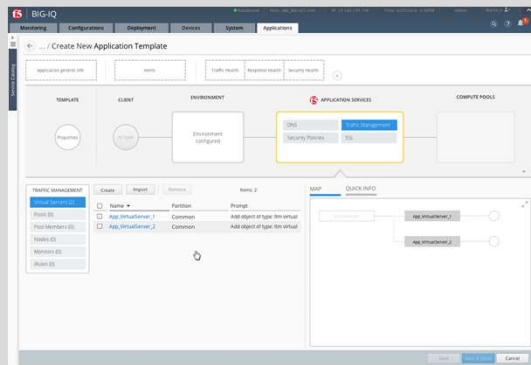
**Get a Unified View of  
the Health of your  
Security Devices**

## 3 Personas, 2 Experiences...

**Network Team**

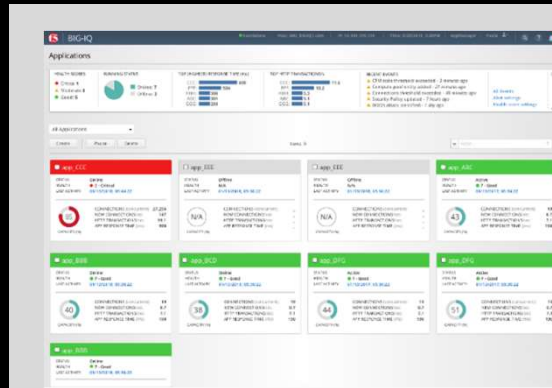
Network  
Engineers

Security Admin



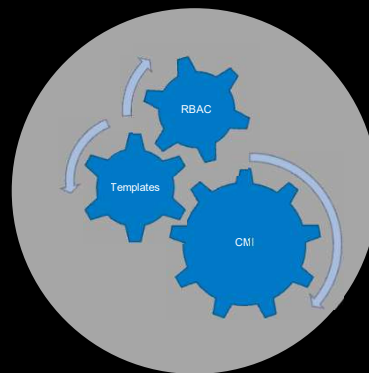
**App Team**

Application  
Managers



Manage Devices  
Create Application  
Templates

Utilize Templates  
Track App Health/  
Performance



**BIG-IQ**

# Application Centric Management

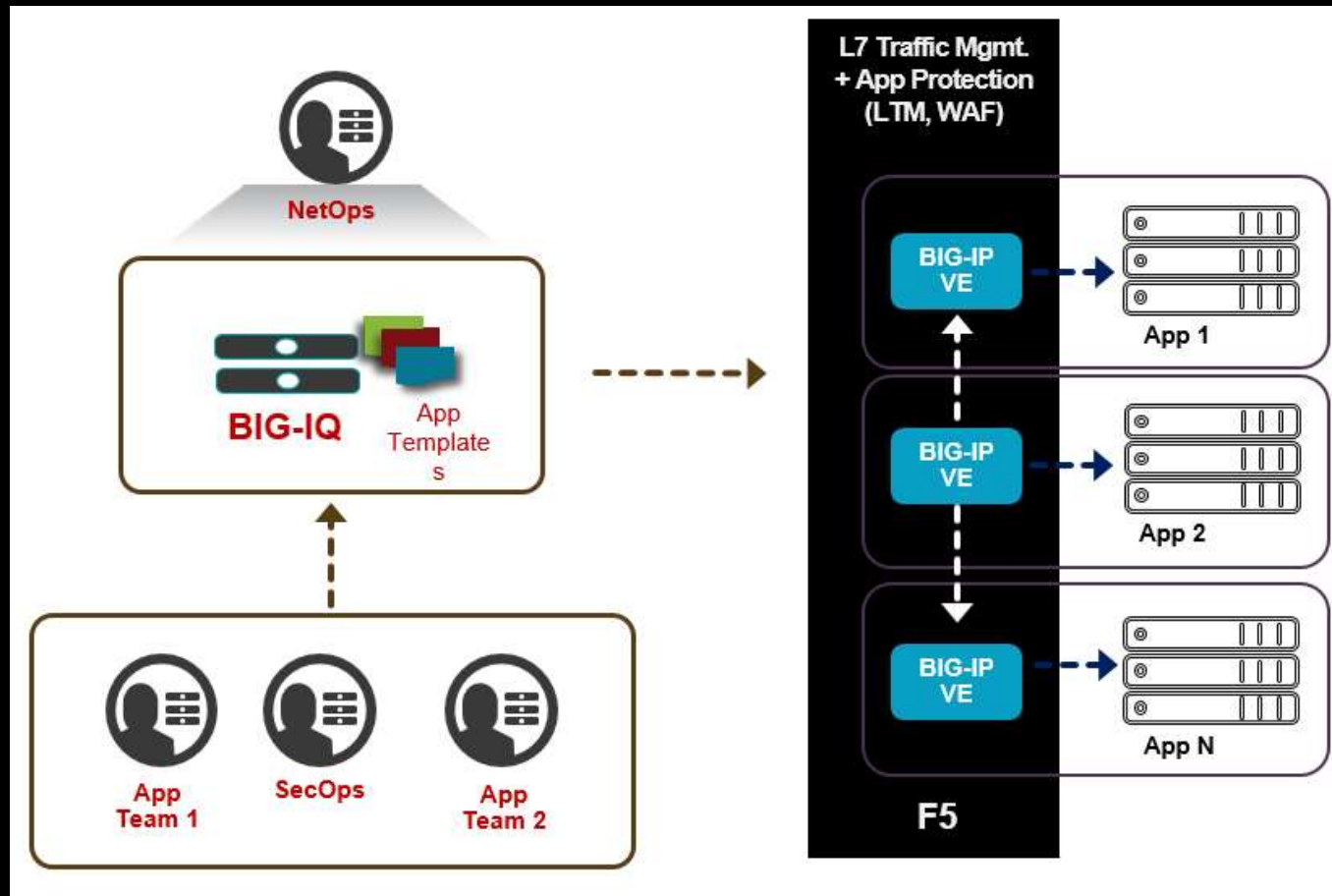
## Application Templates Simplify App Support

### Built-in Templates

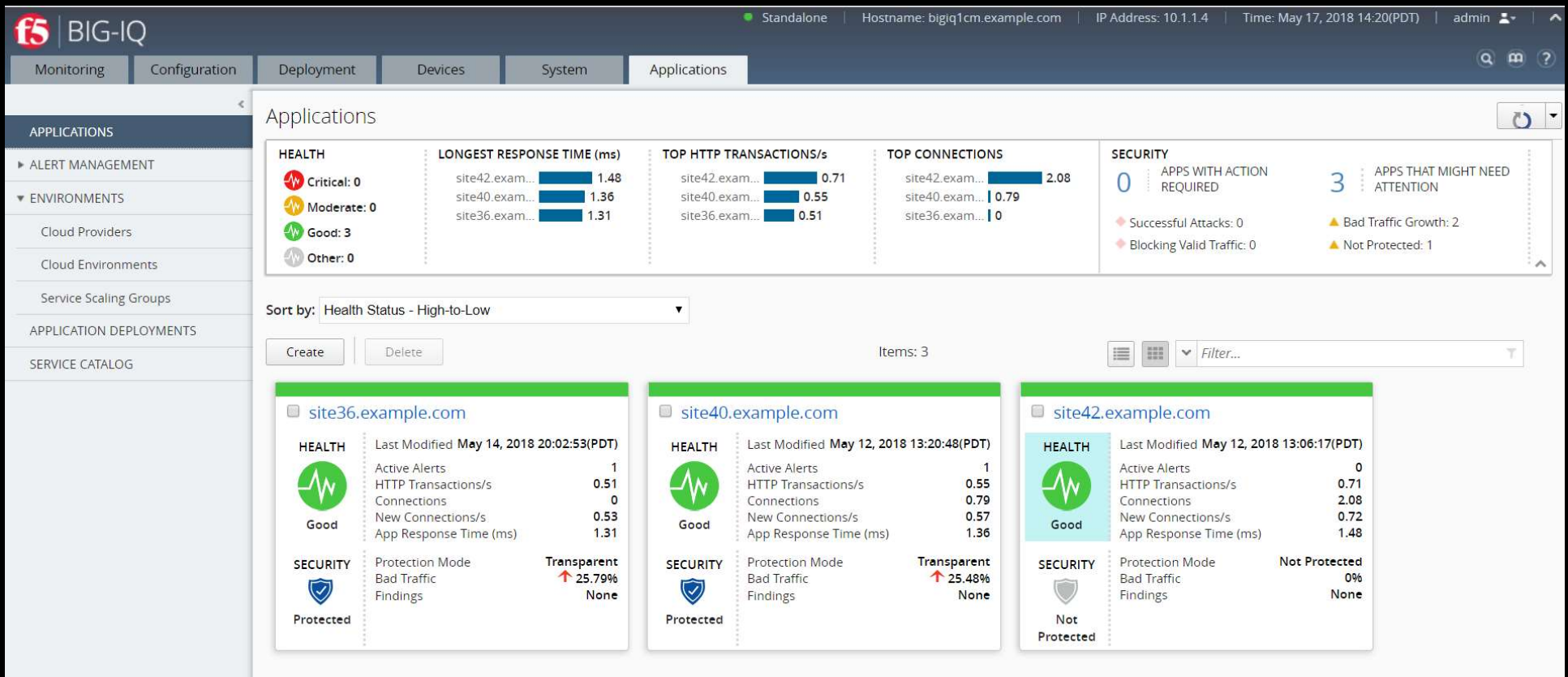
- Basic HTTP Load Balancing
- HTTPS with WAF
- HTTPS Offload
- TCP Fast L4
- UDP Fast L4
- Basic HTTP load balancing with fasthttp profile

### Custom Templates

- HR Apps
- Web Apps
- Finance Apps ....

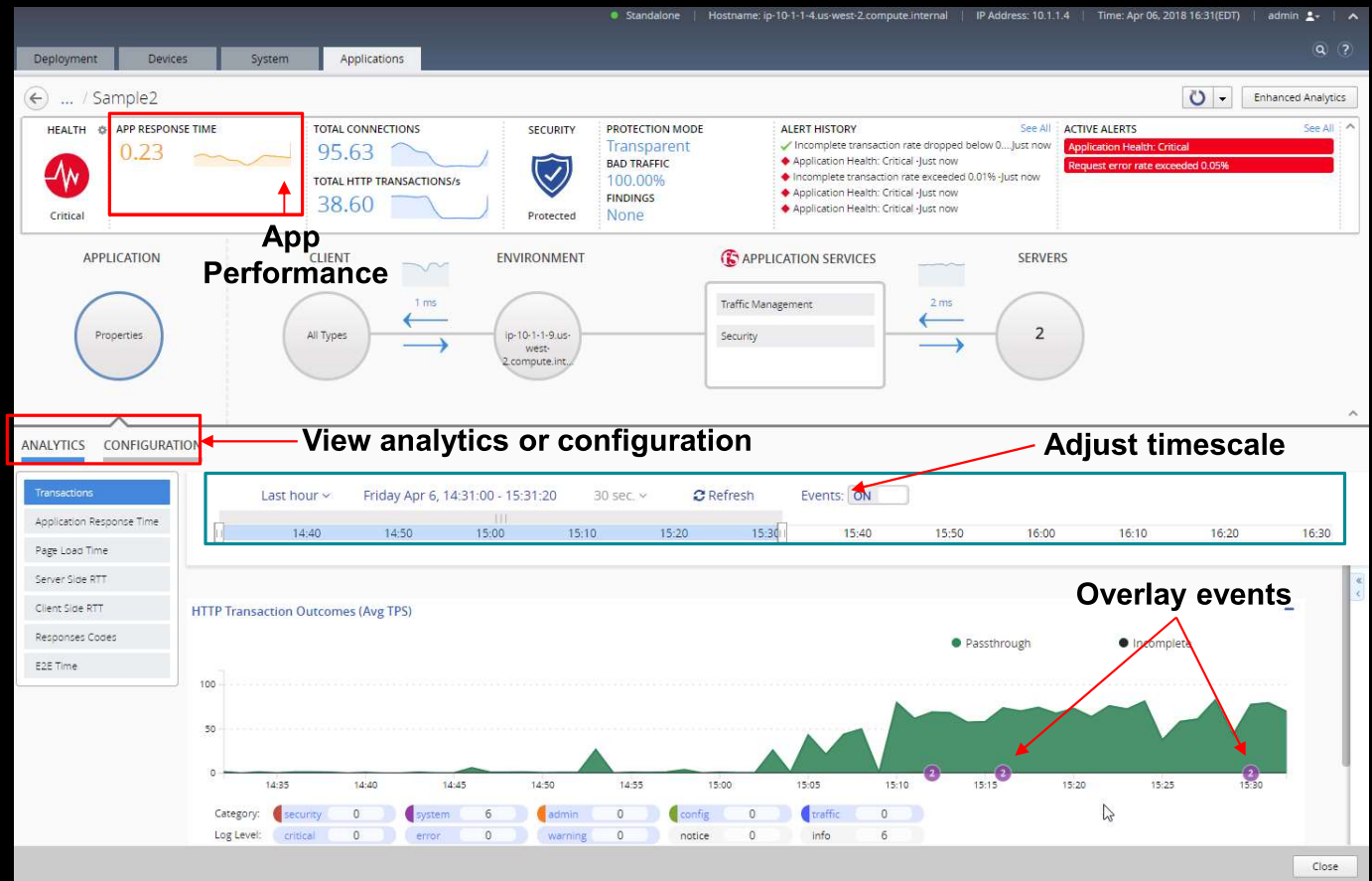


# Application Dashboard



# Application Dashboard - details

Drill down for  
detailed  
analytics on the  
app, env,  
services or  
servers



**Thank You**