# Deep Dive on F5 BIG-IQ, BIG-IP and Cisco ACI for Applications Deployment

Payal Singh, Solution Engineer, F5 Networks

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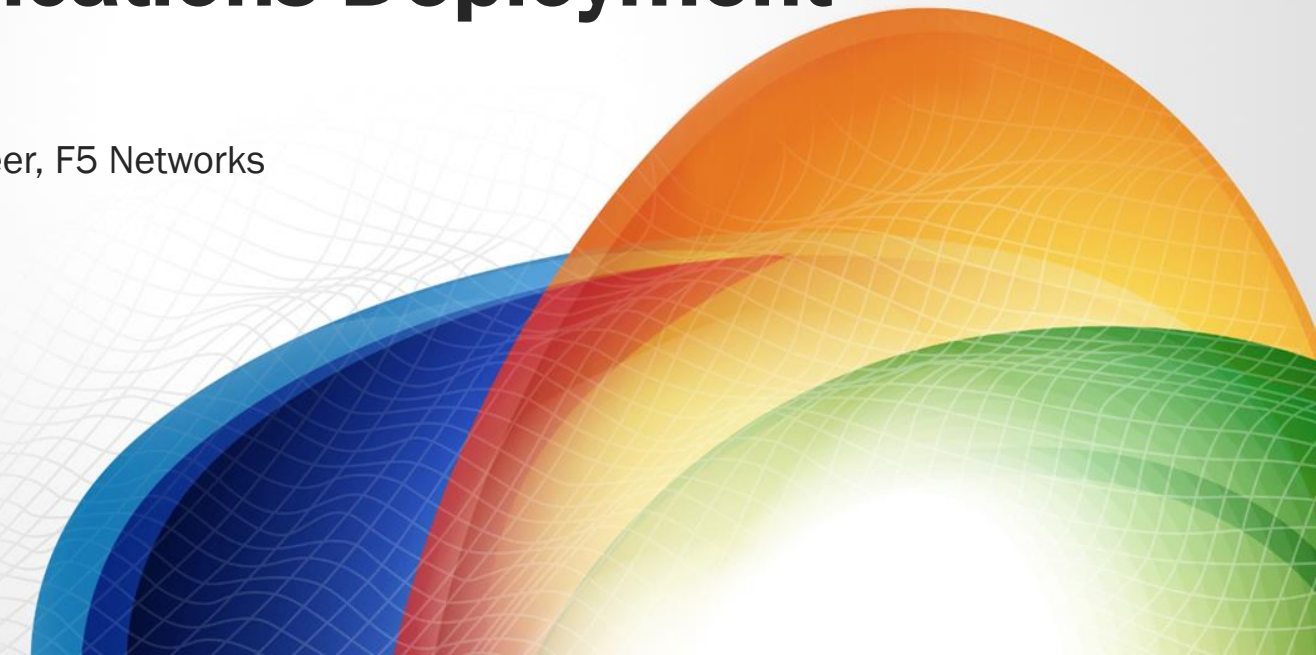


# Abstract

Learn how F5 BIG-IP and BIG-IQ integrate with Cisco Application Centric Infrastructure (ACI) to deploy applications with agility and consistency.

Understand F5 integrations models with Cisco ACI, learn the details of F5 device package and take a look at the latest offerings in F5 ACI solution.

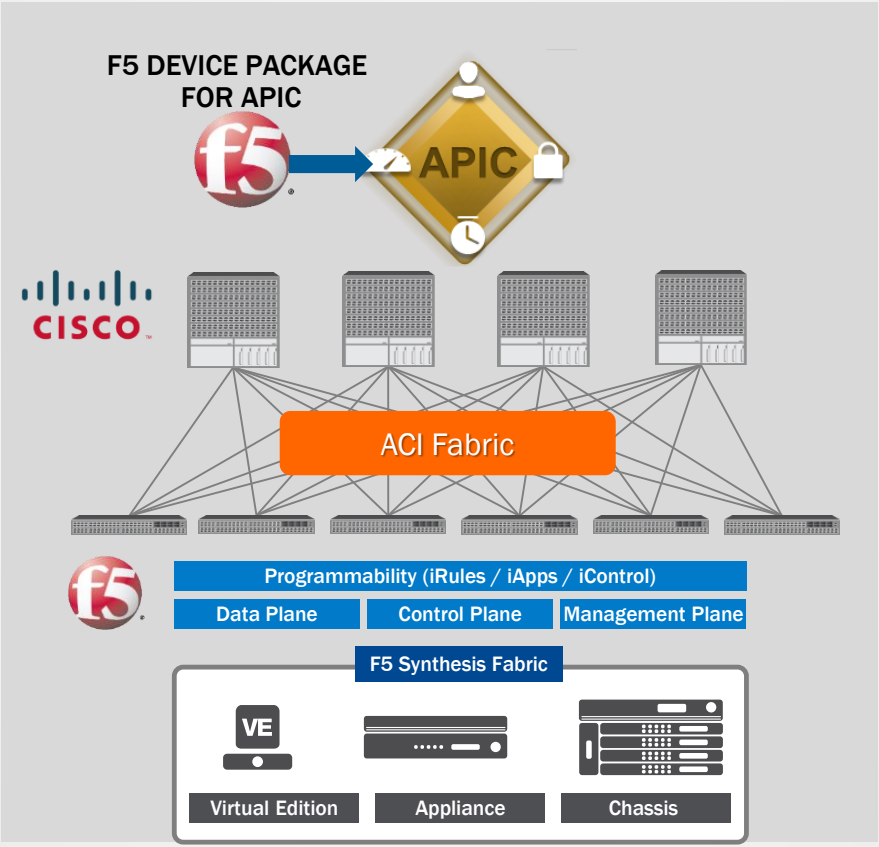
Learn how F5 BIG-IQ and iApps enhance L4-L7 services in ACI for a true application centric approach that leverage higher functionality including additional F5 modules.

# Agenda

- ACI L4 –L7 Service Insertion Overview
- F5 and Cisco ACI integration Models
- Device Package 2.0 Update
  - F5 Static Device Package
  - F5 dynamic Device Package
- F5 ACI Design / Deployment Use Case and implementation

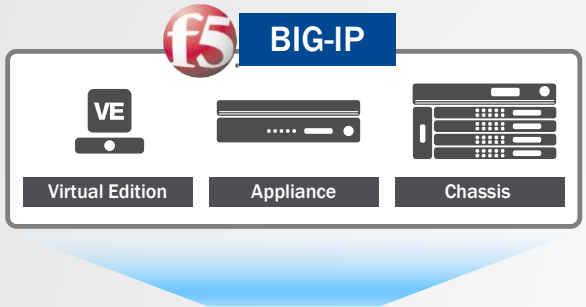
# F5 and Cisco ACI Joint Solution Benefits

- Automated L4-L7 application service insertion
- Accelerated application deployments with scalable L4-L7 services
- Application agility & significant reduction in operating costs




- Preserves richness of F5 Synthesis offering. Ease of integration due to rich programmability
- Existing F5 Physical and Virtual appliances, topologies integrate seamlessly with Cisco ACI
- Maintains operational best practices & offers faster provisioning of workflows

# Understand F5 Components

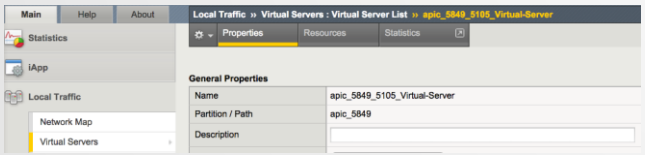



BIG-IP is the name of the platform produced by F5, provide Application Delivery Controller (ADC) functionality. F5 BIG-IP offers virtual, appliance or chassis form factor

LTM

Local Load Balancing

LTM is the Local Traffic Manager, it is a licensed software module run inside a F5 BIG-IP. LTM handles server load balancing function. In the 1st release, F5 integrated LTM into ACI




Virtual Server is the traffic management object on the BIG-IP system that represented by an IP address and a port. VIP = Virtual IP + Port

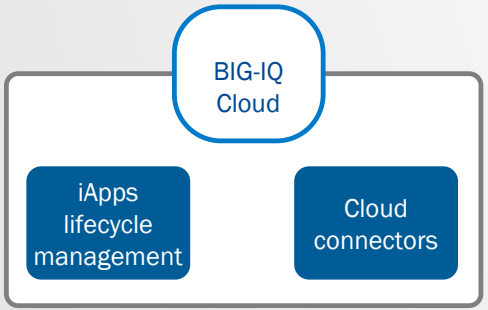
# Understand F5 Components

iApps

iApps is a user-customized framework for deploying applications, providing a flexible way to automate tasks and templatize functionality on F5 gear. iApp can be F5 verified or customer defined. iApp is based on APL (Application Presentation Language)

iRules

iRules is a highly customized, TCL-based scripting language that allows programmatic access to traffic on the wire. You can apply an iRules to an existing virtual server to inspect / analyze / modify / route / manipulate the traffic

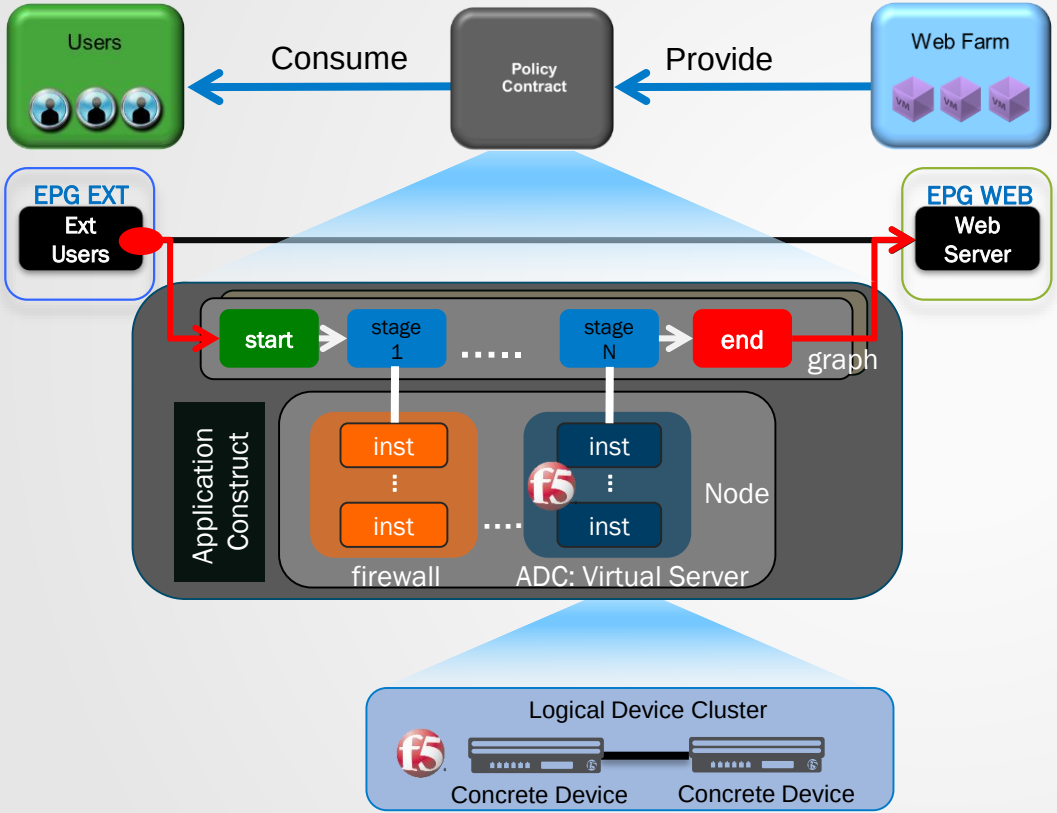



BIG-IQ is an intelligent framework for managing application services

BIG-IQ Cloud injects application specific layer 4–7 intelligence into Cisco ACI. BIG-IQ Cloud generates a catalog of iApps used by all of your BIG-IP devices and makes that catalog available in your orchestration solution

# ACI L4 –L7 Service Insertion Overview

# Service Insertion




- Web Farm provide services to External Users;
- Policy Contract defines relationship between Web Farm and Users

- Users assign to EPG EXT
- Web Farm assign to EPG WEB

- Service Graph Insertion at the Policy Contract Subject level

- Service Graph contains Function Nodes
- Virtual Server is a Function Node

- F5 BIG-IPs are Concrete Devices belong to a Logical Device Cluster that enables ADC as a function Node within a Service Graph

# Goals of APIC Service Insertion and Automation

Configure and Manage VLAN allocation for service insertion

Configure the network to redirect traffic through service device

Configure network and service function parameters on service device

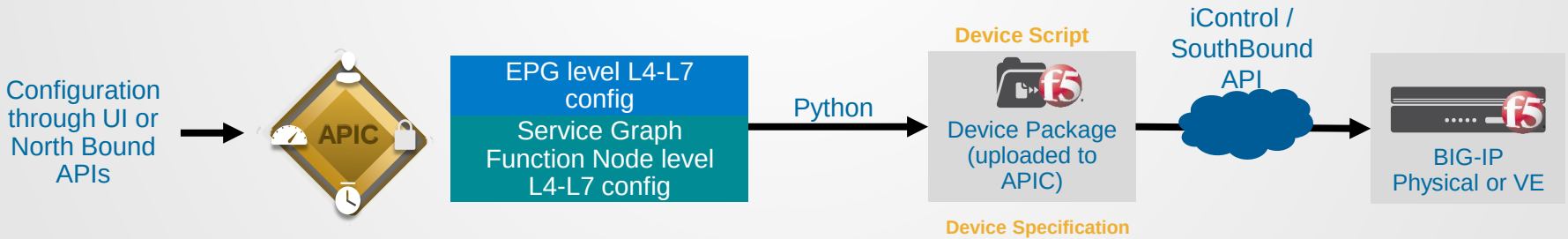
# ACI Service Automation through F5 Device Package

APIC requires a **Device Package** to communicate with service devices.

A **Device Package** is a zip file containing two parts:

**Device Specification (xml):** The configuration of the APIC is represented as an object model consisting of a large number of Managed Objects (MOs). These Managed objects represent BIG-IP functions that can be configured and parameters needed to achieve those functions

**DeviceScript (py):** The integration between the APIC and a Device is performed by a DeviceScript, which maps APIC events function calls defined in Device Script



# F5 and Cisco ACI Integration Models

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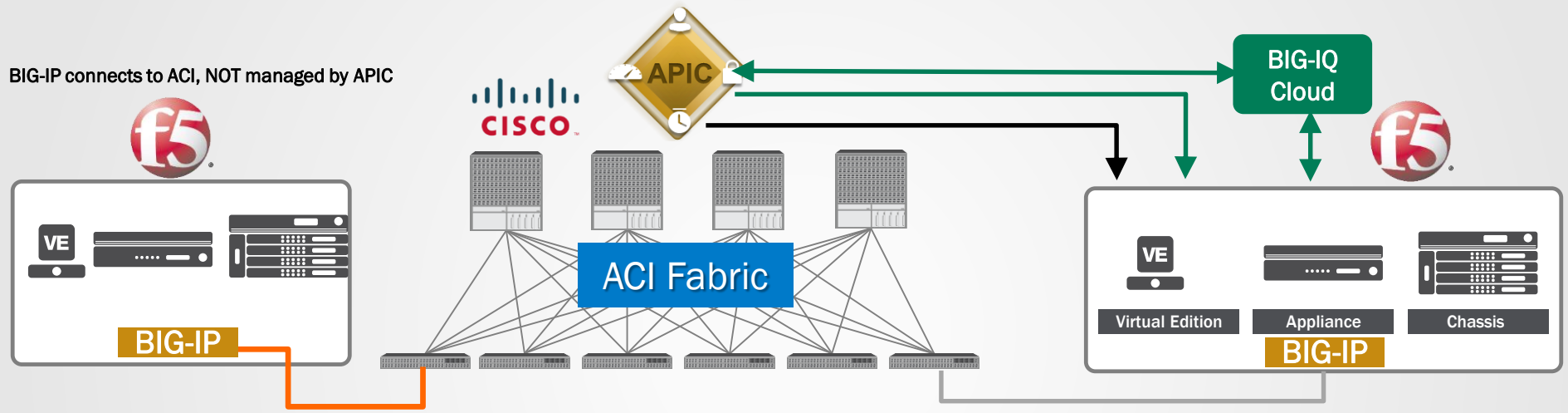



**OPTION A1**

EPG mode – NOT using service graph

**OPTION A2**

Unmanaged mode – USING service graph

**OPTION B**

Service Insertion using F5 Static device package

**OPTION C**

Service Insertion using F5 Dynamic device package

# Option A1 and Option A2

**EPG/Unmanaged Mode (Option A1 and A2)**

- Define connectivity to ACI Fabric
- No Service Insertion
  - No device package
  - BIG-IP device is not provisioned/managed through APIC

## DIFFERENCES

| EPG Mode (Option A1) | Unmanaged Mode (Option A2) |
|---|---|
| No service graph representation<br>• Manual binding of VLAN's, binding contracts to EPG's | Service graph representation<br>• Automatic binding of VLAN's and contracts |
| Manual configuration to steer traffic<br>• One Application tier -> Chain of L4-L7 service devices -> To another application tier | Automatically steer traffic<br>• One application tier -> Chain of L4-L7 service devices -> To another application tier |

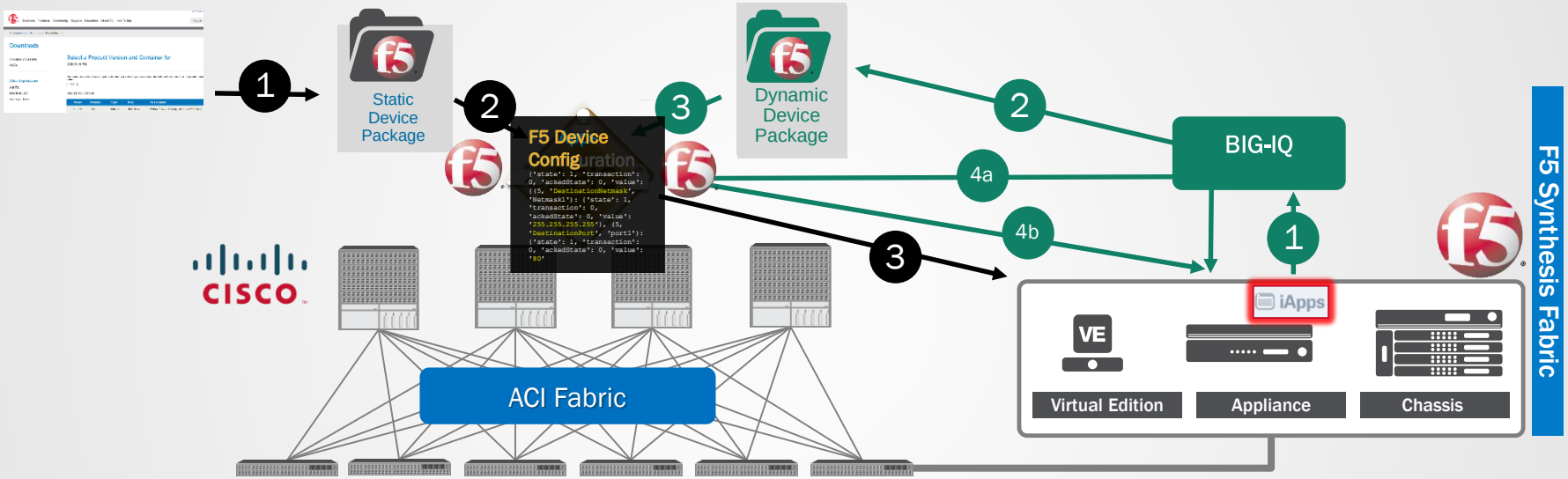
# Differences - Option B and Option C

| Option B | Option C |
| --- | --- |
| **F5 Static device package**<br>• Obtained from http://downloads.f5.com<br>• **Fixed** set of BIG-IP parameters configurable<br>  • Does not support adding more feature functionality on BIG-IP than present in basic load balancing device package | **F5 Dynamic device package**<br>• Obtained from the BIG-IQ<br>• **Dynamic** set of BIG-IP parameters configurable<br>  • Through the iApp there is support to add as many features to the BIG-IP as the iApp can support |
| Not based on iApp templates | Based on iApp templates |
| LTM module support | LTM/ASM/AFM/APM modules can be supported |

# Integration Models with ACI (Option B and Option C)

**F5 Static Device Package Deployment Model**

**F5 Dynamic Device Package Deployment Model**




## Integration with APIC (Option B)

- Obtain device package from downloads.f5.com
- Admin import device package to APIC
- APIC sends config to BIG-IP directly

## Integration with APIC (Option C)

- Upload iApp template to BIG-IP
- BIG-IP expose iApps to BIG-IQ during device discovery by BIG-IQ
- BIG-IQ create custom device package based on catalogs created
- Admin import BIG-IQ device package to APIC
- APIC sends iApp config to BIG-IQ -> BIG-IP
- APIC sends Device config to BIG-IP

# Version compatibility - F5 Static Device Package (Option B)

| | Version 1.2 | Version 2.0 |
|---|---|---|
| BIG-IP Software Versions | 11.6.0 | 11.5.3 HF2 and 11.6.0 HF6 |

| APIC Release | Version 1.2 | Version 2.0 | Version 2.0(*) |
|---|---|---|---|
| 1.1(1o), 1.1(2h) | ✓ | NA | NA |
| 1.1(3f) | | ✓ | |
| 1.1(4e) | | ✓ | |
| 1.2(1i) | | ✓ | |
| 1.2(2*) - Q1CY16 | | Q1CY16<br>EA– Chassis Manager | Q1CY16<br>GA– Chassis Manager |

Validation based on customer needs

# Version compatibility - F5 Dynamic Device Package (Option C)

| | Version 2.0 |
|---|---|
| Software Versions | BIG-IP - 11.5.3 HF2 and 11.6.0 HF6<br><br>BIG-IQ - 1.0 |

| APIC Release | Version 2.0 | Version 2.0(*) |
|---|---|---|
| 1.1(3f) | ✓ | |
| 1.1(4e) | ✓ | |
| 1.2(1i) | ✓ | |
| 1.2(2*) - Q1CY16 | Q1CY16<br>EA– Chassis and Device Manager | Q1CY16<br>GA– Chassis and Device Manager |

Validation based on customer needs

# Device Package 2.0 – Common Features Option B and Option C

# Common Functionality (Option B and Option C)

Operational

- Supports any BIG-IP physical and virtual form factor running
- Does not require any new module installation on the BIG-IP
- BIG-IP is licensed and OOB management configured prior to APIC integration
- Supports BIG-IP Active / Standby High Availability model per APIC logical device cluste

**Features**

- **Chassis Manager - vCMP (Virtualized Clustered Multiprocessing) HA – Q1CY16**
  - Pre-requisite: vCMP guests already deployed
  - Allow user to specify unique vCMP host for each vCMP guest
  - vCMP guests - Active / Standby
- **Supports Dynamic endpoint attach and detach notifications**
- **True multi- tenancy**
  - Tenant + VRF on ACI => Partition + Route Domain on BIG-IP
  - Service Graph on ACI => Virtual Server on the BIG-IP

# F5 Static Device Package Option B

# F5 Static DP 2.0 – Option B

BIG-IP Device Package can be obtained from downloads.f5.com

Device Package version 1.2 + Bug Fixes

## Functions

- Virtual Server
  - Layer 4 Server Load balancing
  - Layer 4 SLB with SSL offload
  - Layer 7 Server Load balancing
  - Layer 7 SLB with SSL offload

### Parameters under Virtual Server

- Configuring Tenant Self IP addresses
- Configuring Tenant static routes
- Monitors
- Server Pools
- HTTP Profiles
- FastL4 Profiles
- HTTP Redirect
- Reference iRules
- Address Translation (None / SNAT / Automap)
- Reference Persistence Profiles

# F5 Dynamic Device Package Option C

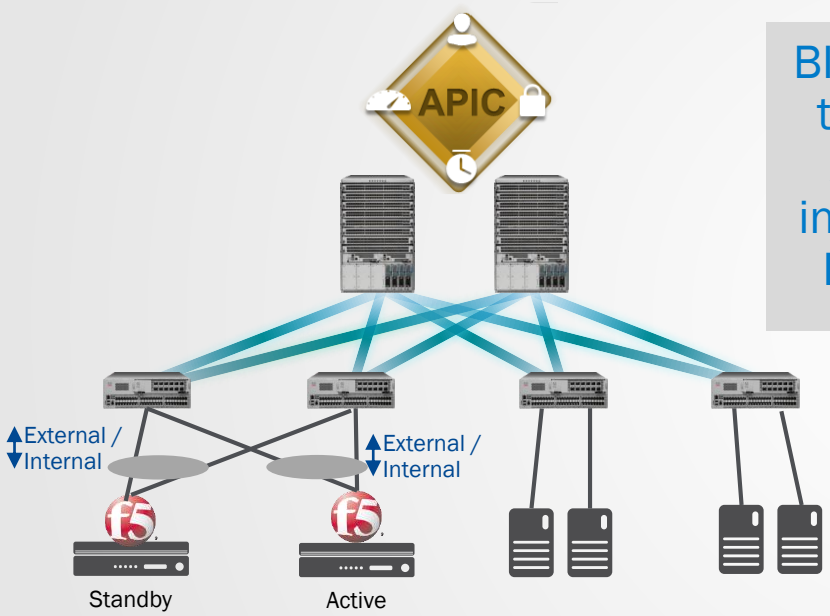
# F5 Dynamic DP 2.0 – Option C

- Device Package dynamically generated by BIG-IQ
- Device Manager - BIG-IQ HA – Q1CY16
  - Pre-requisite: BIG-IQ already in HA (Active/Active)
  - Allow user to specify 2 BIG-IQ through APIC
- Support BIG-IQ validated workflows using iApps

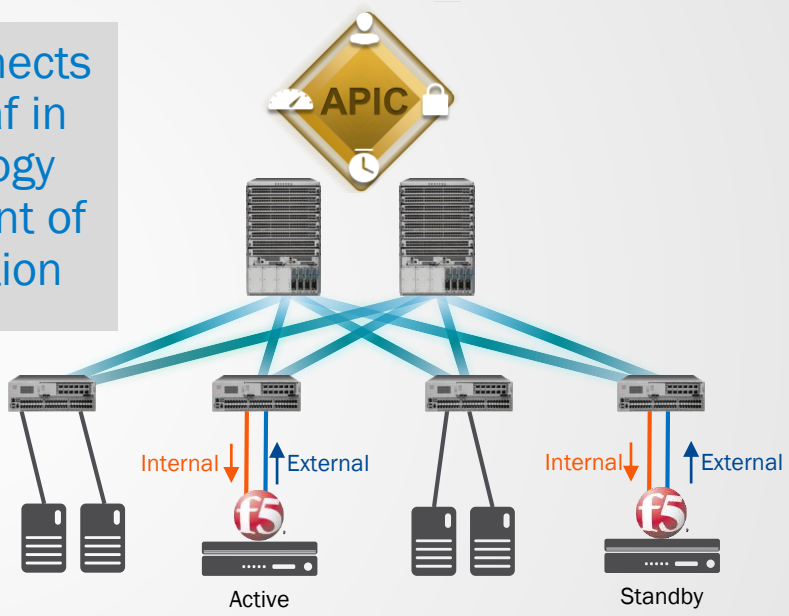
# BIG-IP ACI Design and Deployment

# Cisco ACI Architecture

## BIG-IP Physical 1 ARM and 2-ARM + HA




BIG-IP connects to any Leaf in ACI topology independent of Leaf location




Physical 1-ARM topology + HA pair

Physical 2-ARM topology + HA pair

**PLATFORM INDEPENDENT – ANY HW MODEL AND VIRTUAL EDITION CAN BE USED WITH THE ACI FABRIC**

# Design / Deployment

# EPG Mode - Option A1

# BIG-IP Attached as an EPG – Design

GOAL - Phases approach, where phase 1 move network elements to ACI policy model; L4-L7 elements remain to be controlled by existing operation framework

**L4-L7 (F5) Requirements**

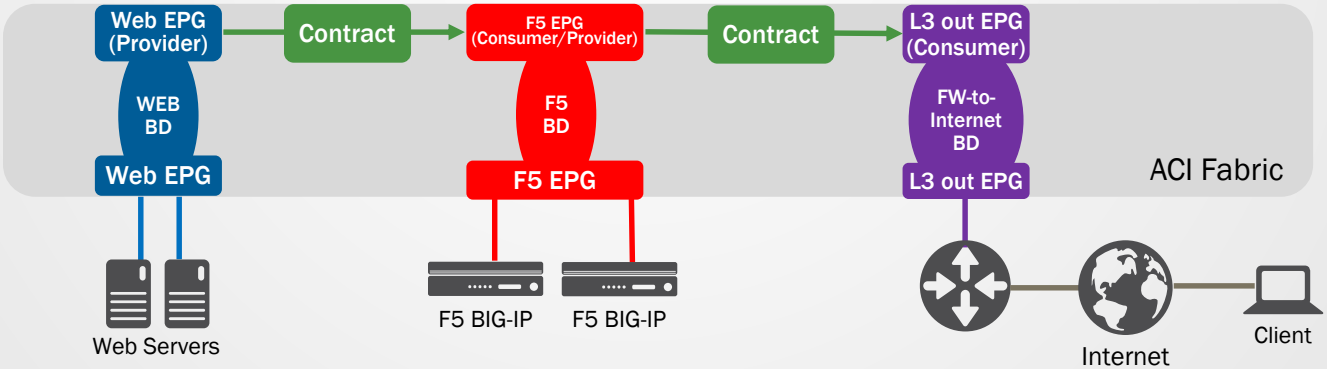
Allow full F5 BIG-IP features; BIG-IP HA through ACI fabric; Utilize existing F5 management model

**Design Considerations**

BIG-IP in 1 ARM or 2 ARM; SNAT or NONE; BIG-IP GW to Firewall; HA failover group

**Proposed Solution**

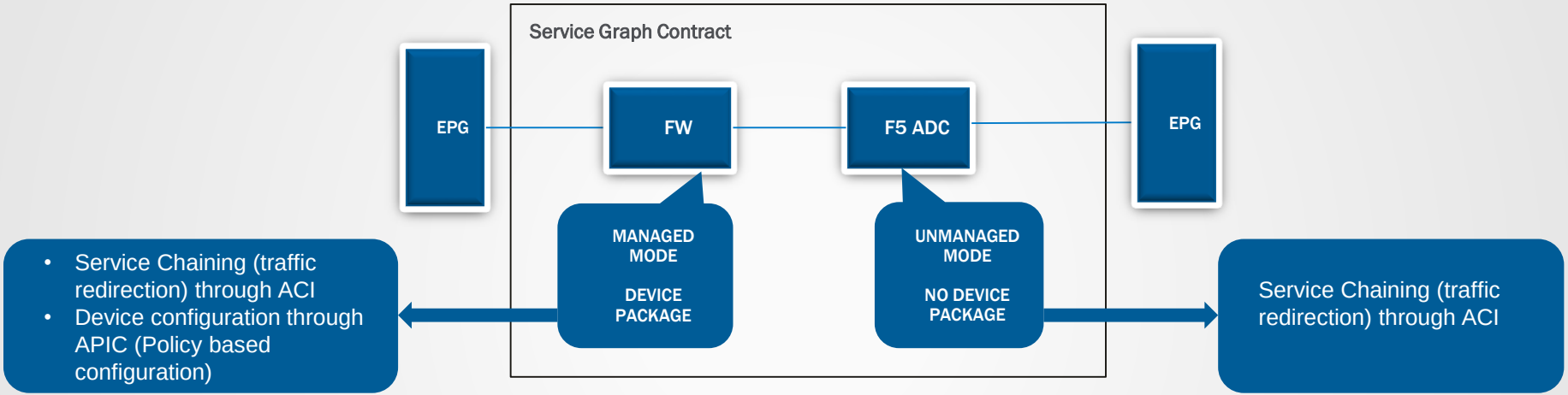
BIG-IP attach to the ACI fabric as an EPG, all BIG-IP configurations will be done through BIG-IP MGMT



# Design / Deployment

# Unmanaged Mode - Option A2

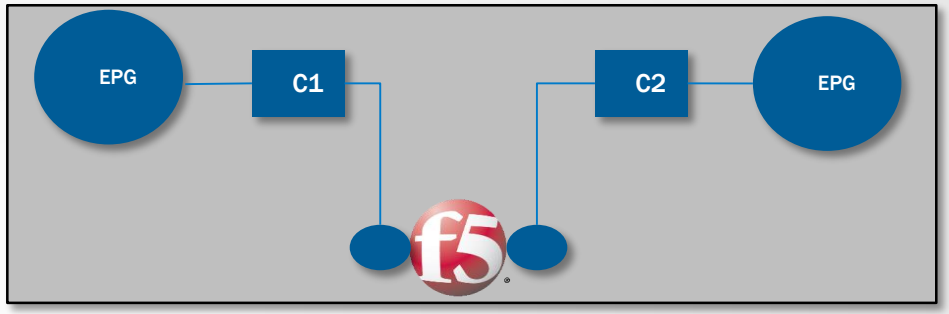
# Unmanaged Mode



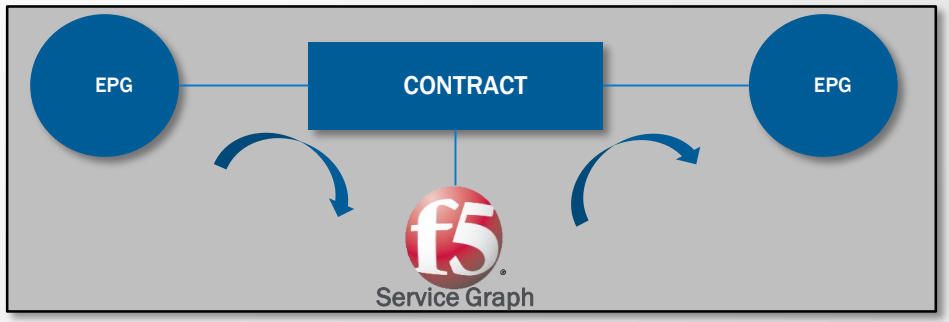

- Provides service graph representation with Unmanaged and Managed modes mixed
  - Few devices managed by APIC, few devices NOT managed by APIC
- BIG-IP attached as an EPG - but now being able to represent this mode within a service graph

# EPG vs Unmanaged mode – Implementation

EPG Mode
(2 Contracts )




Unmanaged Mode
(1 Contract )



# Design / Deployment

# Service Insertion using Static Device Package - Option B

# ACI Service Insertion using Option B– Design

**L4-L7 (F5) Requirements**

One ARM - VIP and servers on the same subnet

Two ARM - Server need to see client real IP

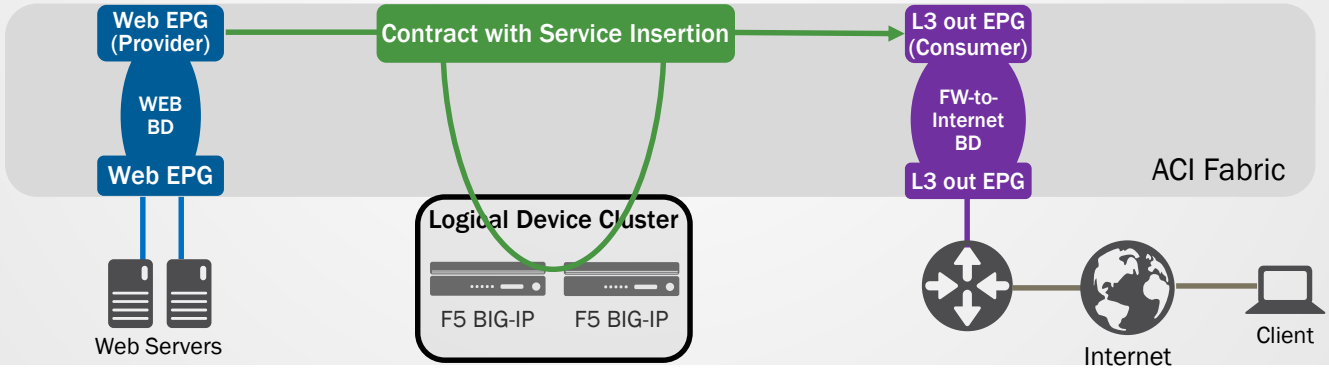
**Design Considerations**

One-Arm - BIG-IP EPG BD same as Provider EPG BD, SNAT Pool or Automap

Two-Arm - SNAT None, server default GW to BIG-IP

**Proposed Solution**

BIG-IP ACI Service Insertion using ADC One-Arm mode or Two-ARM mode



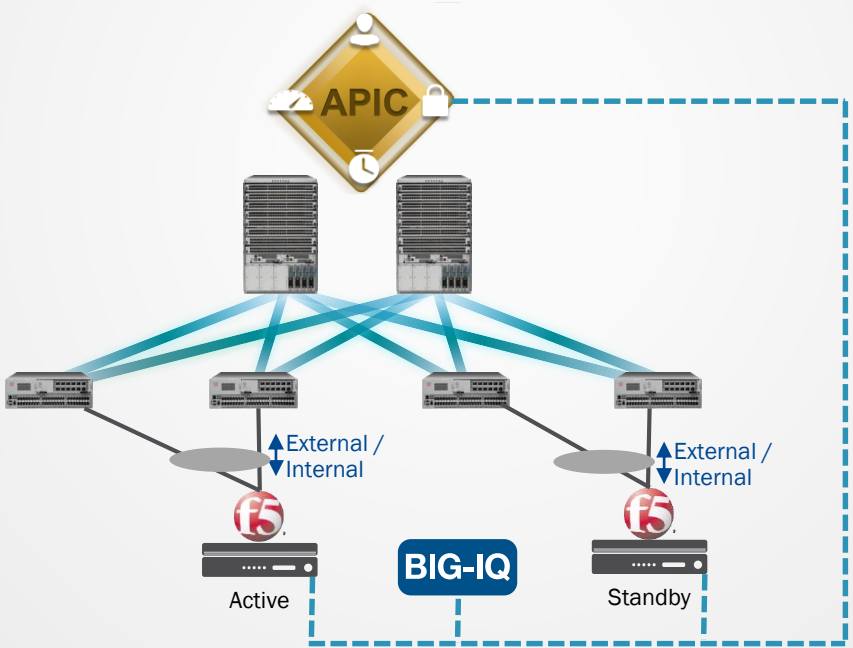
# Design / Deployment

# Service Insertion using Dynamic Device Package - Option C

# ACI Service Insertion using Option C : Deploy iApps through BIG-IQ

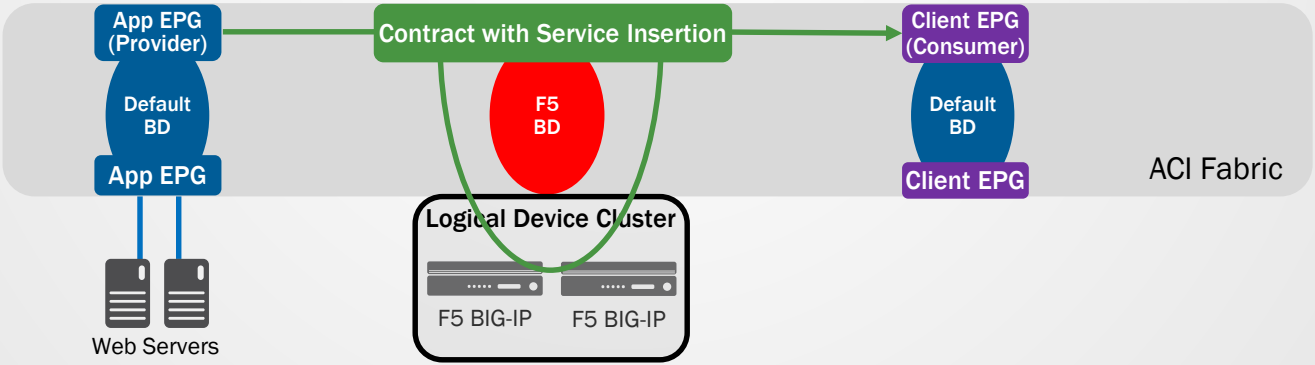
## Goal

Leverage BIG-IQ to bring iApps into ACI intelligently



# ACI Service Insertion using Option C– Design

| | |
|---|---|
| L4-L7 (F5) Requirements | TCP Profiles, Source Port Change, Multiple iRules, SNAT Pool, client / server same subnet, VIP separate subnet |
| Design Considerations | BIG-IP in 1-Arm vs BIG-IP in 2-Arm (Same considerations as Option B integration) |
| Proposed Solution | Device package generated by BIG-IQ leverage custom made iApps |

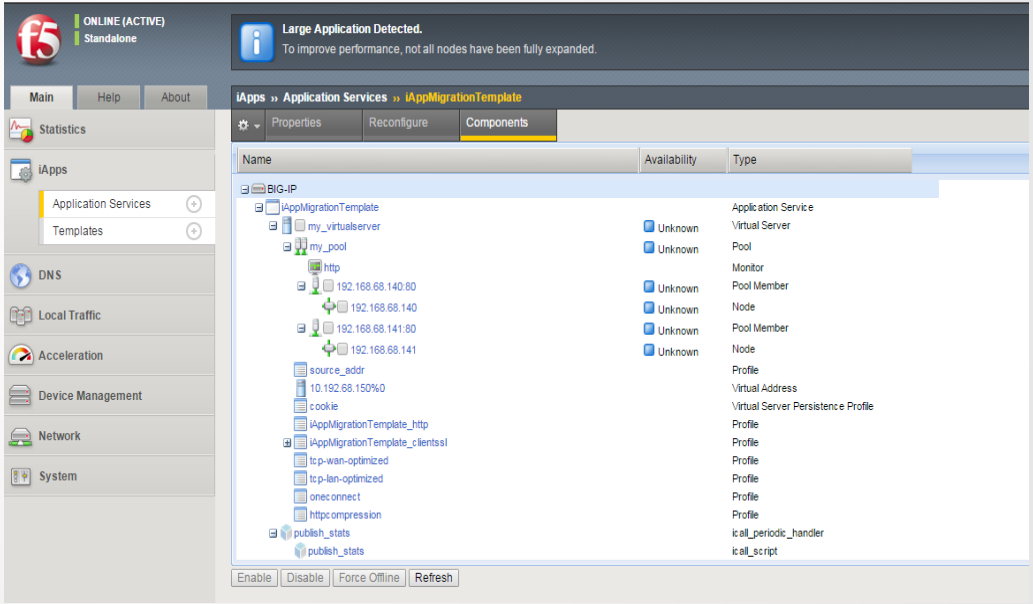


# Revisit iApps

- iApps is the BIG-IP® system framework for deploying services-based, template-driven configurations on BIG-IP systems
- Deployment process of an iApps Template which bundles all of the configuration options for a particular application together

## Benefits

- User-customizable
- Easy editing of configurations and cleanup
- Configuration encapsulation
- Strictness protects against accidental changes to the configuration
- Operational tasks and health status for App objects displayed on App-specific component view
- Copy/Import/Export capability
- Community support for DevCentral hosted templates

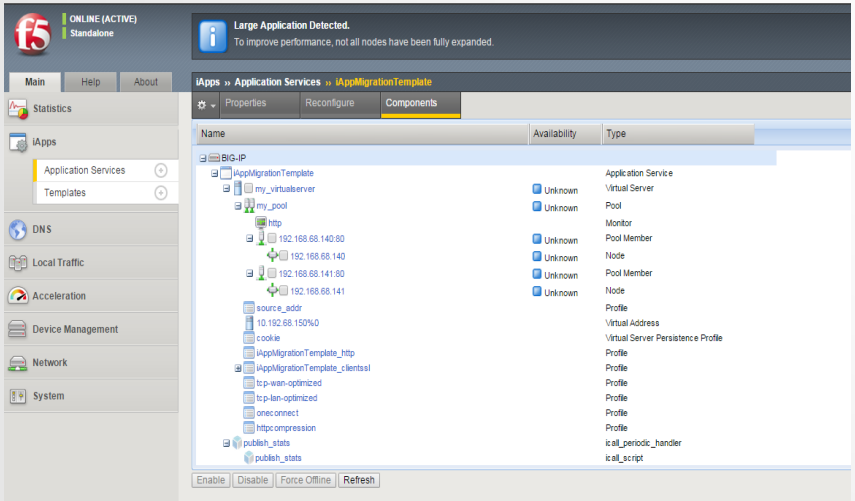


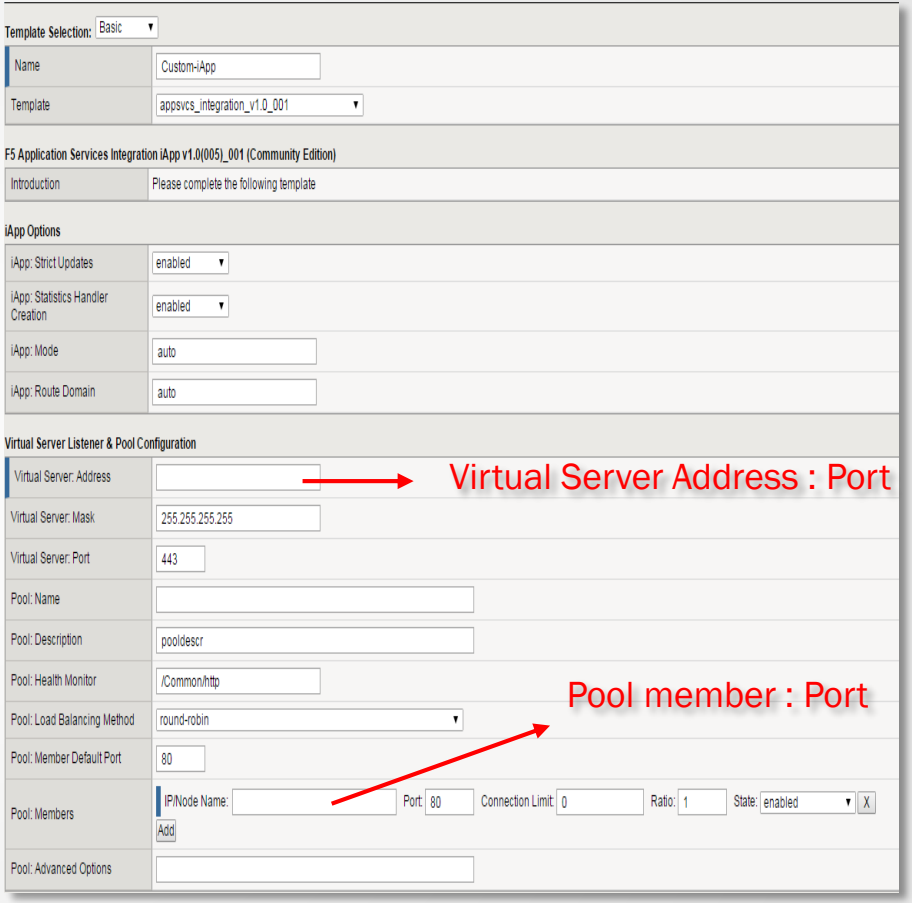
# Revisit iApps

iApps present on BIG-IP

Provide values to the iApps that includes all the virtual server requirements

Save iApp – Configuration pushed to BIG-IP



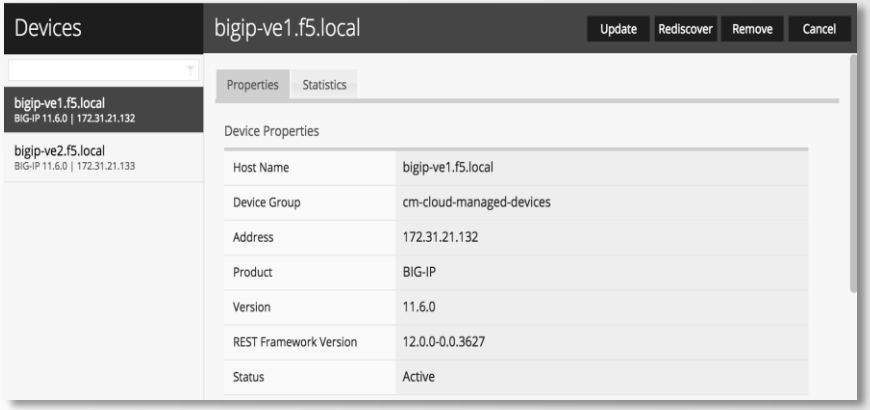



# ACI Service Insertion using Option C - Integration Workflow

## Upload iApps template to BIG-IP

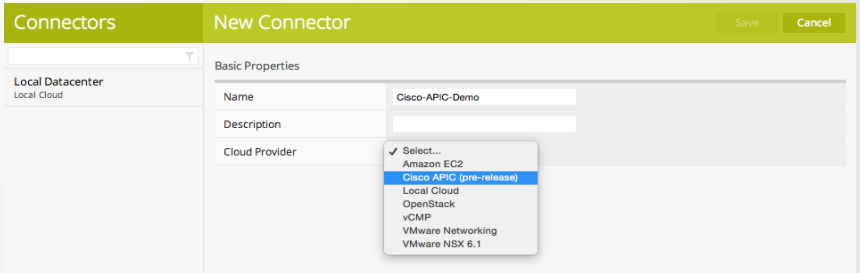
## Discover BIG-IP

- Using BIG-IQ Device, discover the seeded BIG-IP to expose iApps to BIG-IQ




## Associate Connector

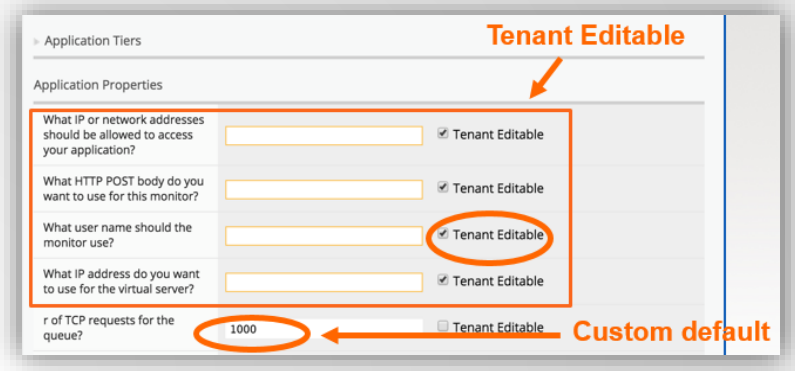
- Using BIG-IQ connector , assign the APIC connector to the BIG-IP device



# ACI Service Insertion using Option C - Integration Workflow

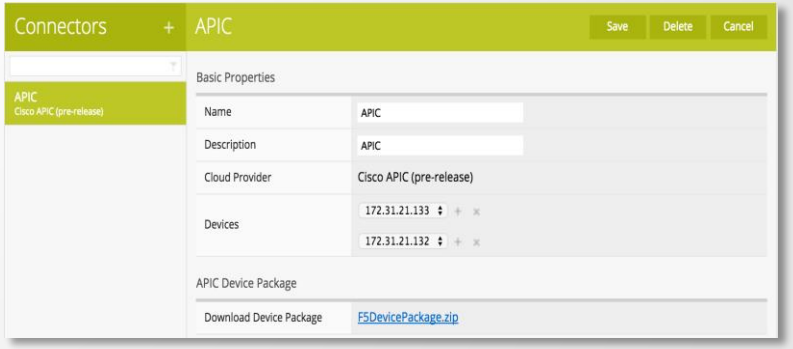
**Make an application catalog template**

- Through BIG-IQ Catalog, create a New Template that utilize iApps on BIG-IP. User can decide which parameters are exposed to APIC; as well as set default values




**Download customized device package**

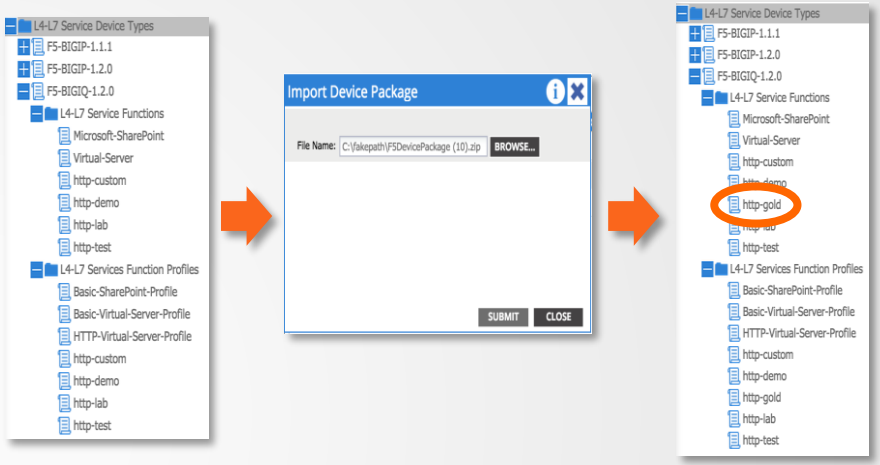
- User can download a device package based on the BIG-IQ catalog selection



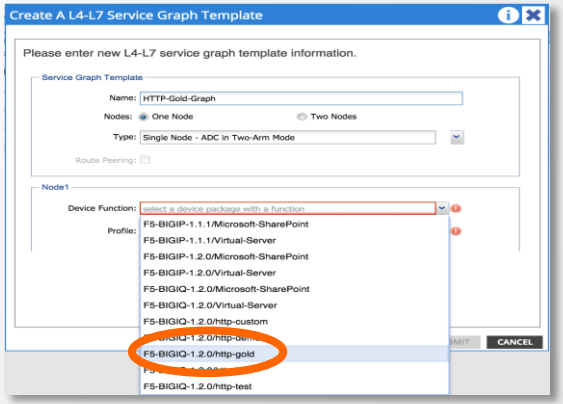
# ACI Service Insertion using Option C - Integration Workflow

**Upload the device package to APIC**

- This will make all the customized catalogs created visible in APIC



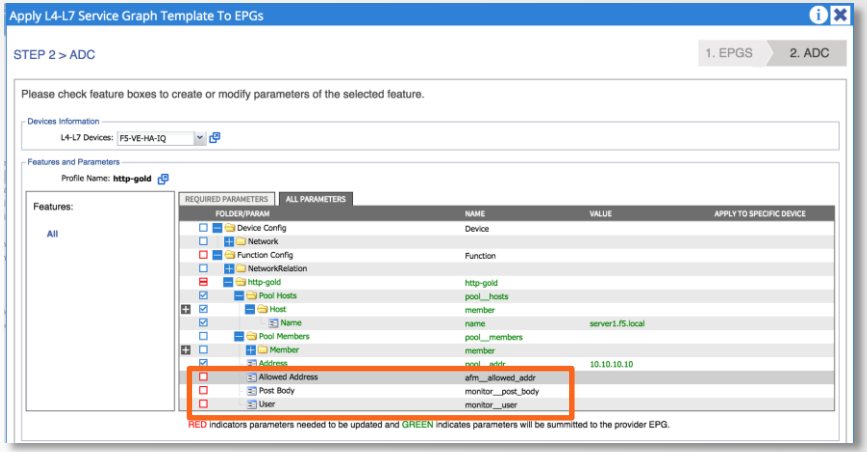

**Create a service graph in APIC by using the catalog**



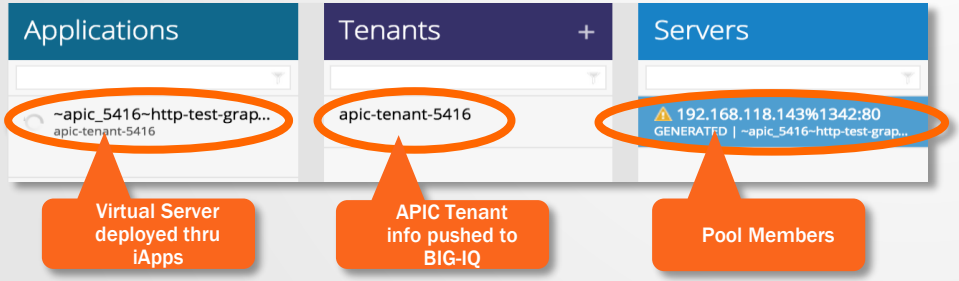
# ACI Service Insertion using Option C - Integration Workflow

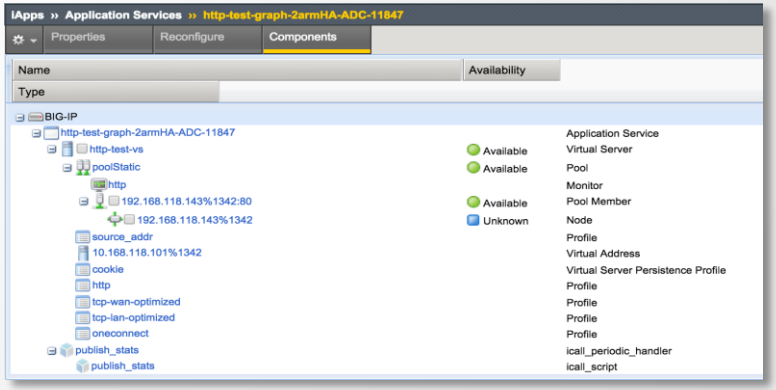
**Configure and deploy service graph**

- Only tenant editable parameter are expose




- At this point all the relevant configuration will be pushed to BIG-IQ -> BIG-IP

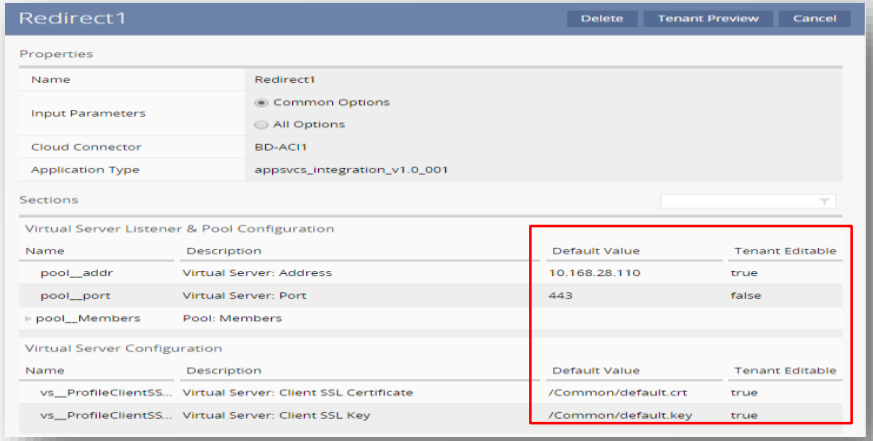


# Use Case – Redirect Request from HTTP to HTTPS

**Configure customized catalog**

- Virtual Server address – Tenant editable 'True'
- Virtual server port – 443
- Client SSL certificates

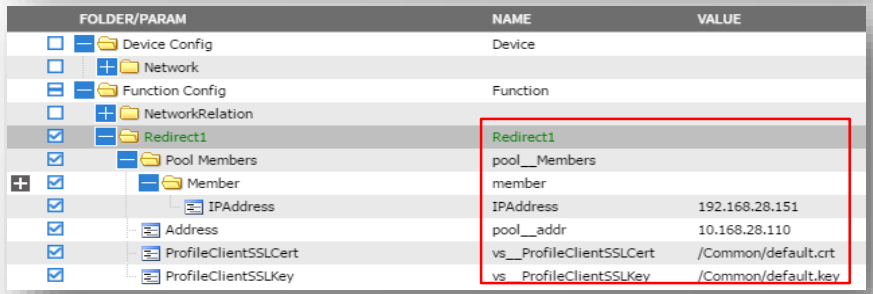



**Follow workflow to deploy a graph using APIC**

- Only tenant editable parameters visible in APIC (Virtual Server address and SSL certs – no Port)

Once deployed - The iApp will create two virtual servers

- One listening on port 80
  - http profile and redirect iRule("_sys_https_redirect") assigned
- One listening on port 443
  - http profile, client SSL offload profile, pool assigned
- Request to port 80 will be redirected to port 443




# References

# Reference Material

For Your Reference

- F5 and Cisco ACI – Design Guide
http://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-735490.pdf

- F5 and Cisco ACI – Deployment Guide
http://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/guide-c07-736160.pdf

- F5 and Cisco ACI: Solution Profile
http://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/guide-c07-736160.pdf

- F5 BIG-IP: Workload Migration from Traditional Networks to Cisco ACI: Design Guide
http://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/guide-c07-733816.pdf

- Automate Application Deployment with F5 LTM and Cisco ACI: White Paper
http://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-732413.pdf

- Cisco Validated Design (CVD) on F5 BIG-IP LTM and Nexus 9000: White Paper
http://www.cisco.com/c/dam/en/us/td/docs/solutions/Enterprise/Data_Center/VMDC/BIG-IP-LTM/CiscoVMDCwithF5_BIG-IP_LTM_WhitePaper.pdf

- Implementing Cisco Nexus 9000 Series NX-OS Mode with F5 Networks' BIG-IP Local Traffic Manager: White Paper
http://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/solution-overview-c22-732522.pdf

- FlexPod Datacenter with Microsoft Exchange 2013, F5 Big-IP and Cisco Application Centric Infrastructure
http://www.cisco.com/c/dam/en/us/td/docs/unified_computing/ucs/UCS_CVDs/exchange2013_aci_flexpod_vmware_design.pdf

- FlexPod Datacenter with Microsoft SharePoint 2013 and Cisco Application Centric Infrastructure (ACI)
http://www.cisco.com/c/dam/en/us/td/docs/unified_computing/ucs/UCS_CVDs/sharepoint2013_aci_flexpod_vmware_deploy.pdf

- Secure ACI Data Centers: Deploying Highly Available Services with Cisco and F5
http://www.cisco.com/c/dam/en/us/solutions/collateral/enterprise-networks/secure-data-center-solution/secure-aci-datacenterr.pdf

**For more reference material**

- **https://f5.com/solutions/technology-alliances/cisco**
- **http://www.cisco.com/c/en/us/solutions/data-center-virtualization/application-centric-infrastructure/white-paper-listing.html**

# DevCentral F5 User Community

## Over 220,000 Members in 191 Countries and Growing!

**References**

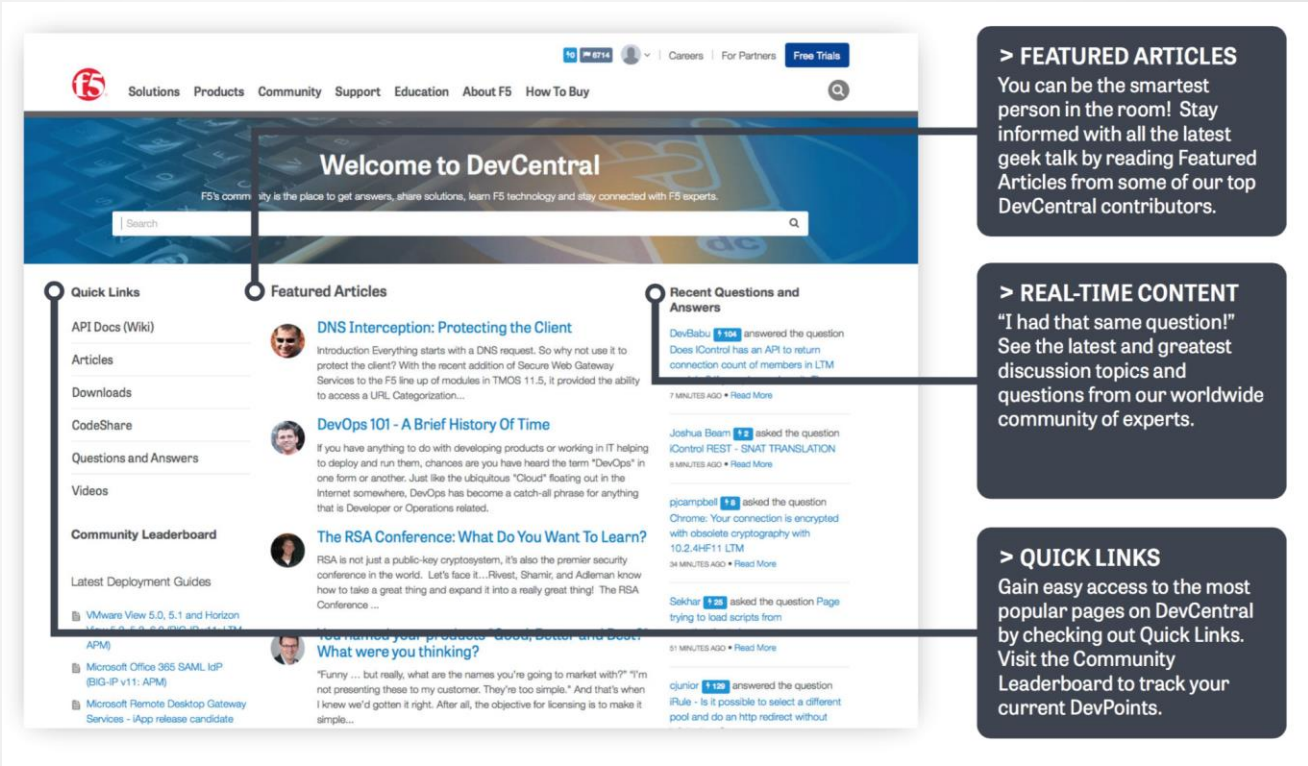
- Wikis
- API/SDK Documentation

**Resources**

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

**Tools and Frameworks**

- iRule Editor
- iControl SDK
- NET, Java,  Python, Powershell,



# Key Takeaways

- F5 Software Defined Application Services (SDAS) vision perfectly aligns with Cisco Application Centric Infrastructure
- F5 BIG-IP integrates into Cisco ACI architecture
- Key benefits of the integration models:
  - Multi-Tenancy, Multi-Graph Support
  - Use Case Focus
  - Automation Ready
- F5 iApps Integration with Cisco ACI brings enhanced application functionalities to ACI

# Cisco Live Berlin 2016

- Visit stand P2 to meet with SME's and watch live demos of F5 and Cisco solutions that enable rapid, secure, and reliable L2–7 services across physical, virtual, and cloud platforms.
- Attend technical breakout session **BRKSP-2003** for a technical deep dive on F5 BIG-IQ, BIG-IP and Cisco ACI for applications deployment.
- Don’t miss F5’s in-stand presentations or demos on solutions that provide network automation and programmability for application deployments for existing and next-generation data centers, located in stand P2. By visiting you’ll be entered into a drawing for a chance to win Apple Watches, BeatsPill speakers and Beats PowerBeats 2 Wireless headphones.

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For more information on the F5 and Cisco partnership and joint solution integration, please visit https://f5.com/solutions/technology-alliances/cisco

Solutions for an application world.