Appendix 8: Replace Flannel w/ Calico¶

This appendix will walk through the steps to replace Flannel with Calico.
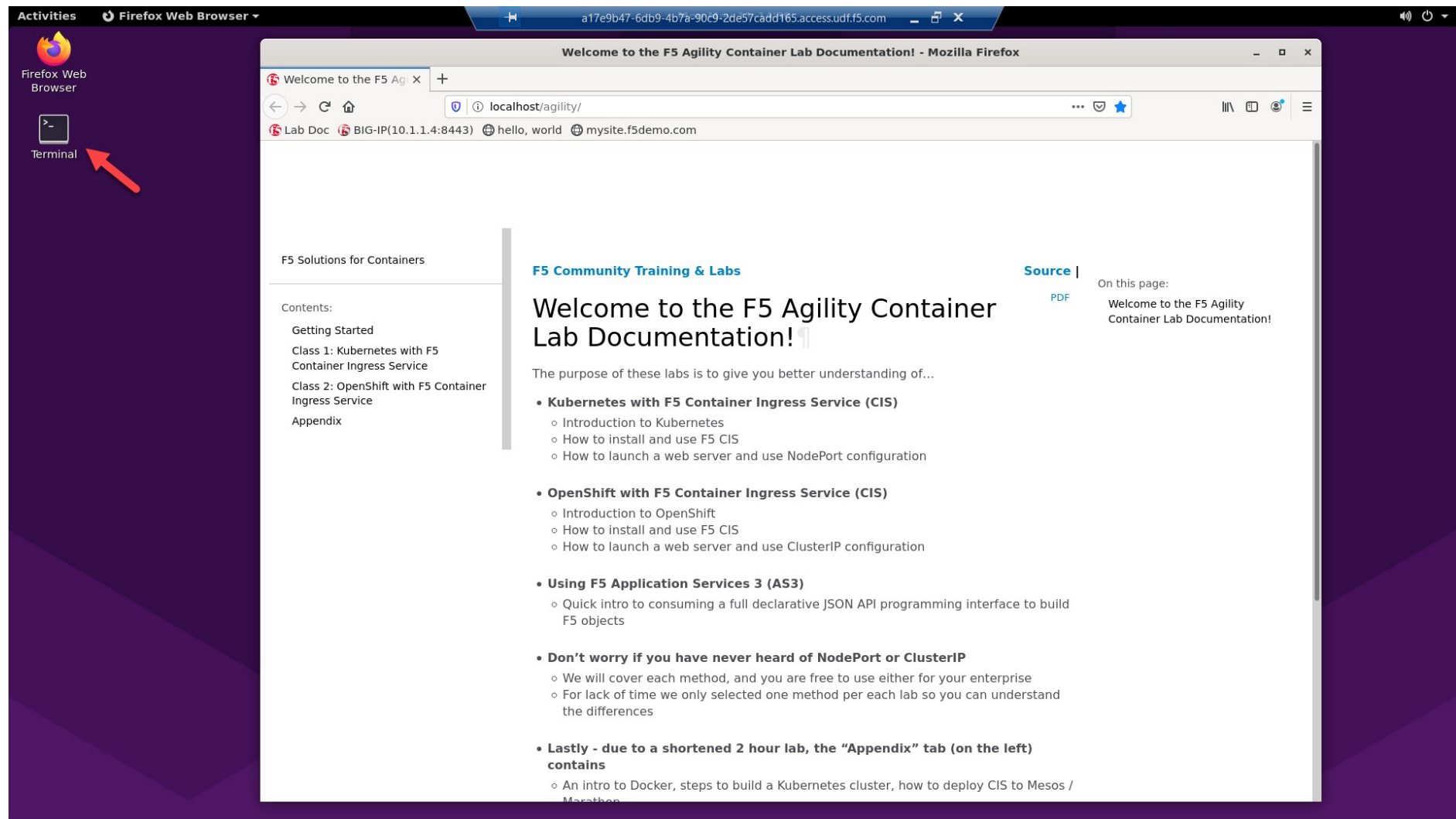
Expected time to complete: **15 minutes**

Via RDP connect to the UDF lab "jumpbox" host.

> ### ⓘ Note
>
> Username and password are: **ubuntu/ubuntu**

On the jumphost open a terminal and start an SSH session with kube-master1.

```
# If directed to, accept the authenticity of the host by typing "yes" and hitting Enter to continue.

ssh kube-master1
```

```
ubuntu@jumpbox:~/agilitydocs$ ssh kube-master1
The authenticity of host 'kube-master1 (10.1.1.7)' can't be established.
ECDSA key fingerprint is SHA256:AtOgu+toPPWC+1jB0xetQwZh5QipPspRZnabKwYubL0.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'kube-master1,10.1.1.7' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 18.04.3 LTS (GNU/Linux 4.15.0-1058-aws x86_64)
```

Remove Flannel¶

1. Show running Flannel pods

```
kubectl get pods -n kube-system
```

```
ubuntu@kube-master1:~/agilitydocs/docs/class1/kubernetes$ kubectl get pods -n kube-system
NAME                                    READY   STATUS     RESTARTS    AGE
coredns-6955765f44-tgk46                1/1     Running    17          198d
coredns-6955765f44-wbjkf                1/1     Running    17          198d
etcd-kube-master1                       1/1     Running    1           105m
kube-apiserver-kube-master1             1/1     Running    1           105m
kube-controller-manager-kube-master1    1/1     Running    1           105m
kube-flannel-ds-amd64-9zq65             1/1     Running    31          198d
kube-flannel-ds-amd64-q7mvf             1/1     Running    31          198d
kube-flannel-ds-amd64-wpr27             1/1     Running    22          198d
kube-proxy-68zgk                        1/1     Running    16          198d
kube-proxy-n8hcc                        1/1     Running    17          198d
kube-proxy-wrt98                        1/1     Running    16          198d
kube-scheduler-kube-master1             1/1     Running    1           105m
ubuntu@kube-master1:~/agilitydocs/docs/class1/kubernetes$
```

2. Remove Flannel

```
kubectl delete -f https://raw.githubusercontent.com/coreos/flannel/master/Documentation/kube-flannel.yml
```

3. Validate Flannel pods are removed. (Run previous kubectl command)

```
kubectl get pods -n kube-system
```

```
ubuntu@kube-master1:~/agilitydocs/docs/class1/kubernetes$ kubectl get pods -n kube-system
NAME                                    READY   STATUS         RESTARTS   AGE
coredns-6955765f44-tgk46                1/1     Running        17         198d
coredns-6955765f44-wbjkf                1/1     Running        17         198d
etcd-kube-master1                       1/1     Running        1          111m
kube-apiserver-kube-master1             1/1     Running        1          111m
kube-controller-manager-kube-master1    1/1     Running        1          110m
kube-flannel-ds-amd64-9zq65             1/1     Terminating    31         198d
kube-flannel-ds-amd64-q7mvf             1/1     Terminating    31         198d
kube-flannel-ds-amd64-wpr27             1/1     Terminating    22         198d
kube-proxy-68zgk                        1/1     Running        16         198d
kube-proxy-n8hcc                        1/1     Running        17         198d
kube-proxy-wrt98                        1/1     Running        16         198d
kube-scheduler-kube-master1             1/1     Running        1          111m
```

ⓘ Note

Run this command several times until you no longer see the "kube-flannel" pods.

4. Cleanup CIS deployment file.

ⓘ Note

This step can be skipped but several errors will appear in the CIS pod log.

```
vim ~/agilitydocs/docs/class1/kubernetes/cluster-deployment.yaml
```

Remove "–flannel-name=k8s-tunnel" from the bottom of the file. Be sure to remove the "," on the line above the removed the line.

After editing the file should look like the following:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: k8s-bigip-ctlr
  namespace: kube-system
spec:
  replicas: 1
  selector:
    matchLabels:
      app: k8s-bigip-ctlr
  template:
    metadata:
      name: k8s-bigip-ctlr
      labels:
        app: k8s-bigip-ctlr
    spec:
      serviceAccountName: k8s-bigip-ctlr
      containers:
        - name: k8s-bigip-ctlr
          image: "f5networks/k8s-bigip-ctlr:latest"
          imagePullPolicy: IfNotPresent
          env:
            - name: BIGIP_USERNAME
              valueFrom:
                secretKeyRef:
                  name: bigip-login
                  key: username
            - name: BIGIP_PASSWORD
              valueFrom:
                secretKeyRef:
                  name: bigip-login
                  key: password
          command: ["/app/bin/k8s-bigip-ctlr"]
          args: [
            "--bigip-username=$(BIGIP_USERNAME)",
            "--bigip-password=$(BIGIP_PASSWORD)",
            "--bigip-url=https://10.1.1.4:8443",
            "--insecure=true",
            "--bigip-partition=kubernetes",
```

Install Calico¶

1. Change local directory to the lab calico dir.

   ```
   cd ~/agilitydocs/docs/class1/kubernetes/calico
   ```

2. Download calico manifest

   ```
   curl https://docs.projectcalico.org/manifests/calico.yaml -O
   ```

3. Modify the manifest with proper POD CIDR

   ### ❶ Important

   This lab was built with Flannel and the default POD CIDR of 10.244.0.0/16. The calico.yaml manifest uses
   192.168.0.0/16 so has to be adjusted.

   ```
   vim calico.yaml
   ```

   ### ❶ Note

   If unfamiliar with VI the instructor will walk you through the commands.

   Find the "CALICO__IPV4POOL_CIDR variable and uncomment the two lines as shown below. Replacing "192.168.0.0/16" with
   "10.244.0.0/16"

```
⊞                    ubuntu@kube-master1: ~/agilitydocs/docs/class1/kubernetes/calico

     # The default IPv4 pool to create on startup if none exists. Pod IPs will be
     # chosen from this range. Changing this value after installation will have
     # no effect. This should fall within `--cluster-cidr`.
   - name: CALICO_IPV4POOL_CIDR
     value: "10.244.0.0/16"
     # Disable file logging so `kubectl logs` works.
   - name: CALICO_DISABLE_FILE_LOGGING
     value: "true"
     # Set Felix endpoint to host default action to ACCEPT.
   - name: FELIX_DEFAULTENDPOINTTOHOSTACTION
     value: "ACCEPT"
     # Disable IPv6 on Kubernetes.
   - name: FELIX_IPV6SUPPORT
     value: "false"
     # Set Felix logging to "info"
   - name: FELIX_LOGSEVERITYSCREEN
     value: "info"
   - name: FELIX_HEALTHENABLED
     value: "true"
  securityContext:
    privileged: true
  resources:
    requests:
      cpu: 250m
  livenessProbe:
    exec:
      command:
      - /bin/calico-node
      - -felix-live
      - -bird-live
    periodSeconds: 10
    initialDelaySeconds: 10
    failureThreshold: 6
  readinessProbe:
    exec:
      command:
        /bin/calico-node
```

4. Start Calico on the cluster

```
kubectl apply -f calico.yaml
```

5. Validate Calico pods are installed and running

```
kubectl get pods -n kube-system
```

```
ubuntu@kube-master1:~/agilitydocs/docs/class1/kubernetes/calico$ kubectl get pods -n kube-system
NAME                                          READY   STATUS    RESTARTS   AGE
calico-kube-controllers-59d85c5c84-mj8x4      1/1     Running   0          107s
calico-node-8c96x                             1/1     Running   0          107s
calico-node-gnrt4                             1/1     Running   0          107s
calico-node-hhqlc                             1/1     Running   0          107s
coredns-6955765f44-tgk46                      1/1     Running   17         198d
coredns-6955765f44-wbjkf                      1/1     Running   17         198d
etcd-kube-master1                             1/1     Running   1          129m
kube-apiserver-kube-master1                   1/1     Running   1          129m
kube-controller-manager-kube-master1          1/1     Running   1          129m
kube-proxy-68zgk                              1/1     Running   16         198d
kube-proxy-n8hcc                              1/1     Running   17         198d
kube-proxy-wrt98                              1/1     Running   16         198d
kube-scheduler-kube-master1                   1/1     Running   1          129m
ubuntu@kube-master1:~/agilitydocs/docs/class1/kubernetes/calico$
```

Install calicoctl¶

1. Retrieve the calicoctl binary

```
curl -O -L https://github.com/projectcalico/calicoctl/releases/download/v3.15.1/calicoctl

chmod +x calicoctl

sudo mv calicoctl /usr/local/bin
```

2. Copy the the calicoctl.cfg file to /etc/calico/

```
1 apiVersion: projectcalico.org/v3
2 kind: CalicoAPIConfig
3 metadata:
4 spec:
5   datastoreType: "kubernetes"
6   kubeconfig: "/home/ubuntu/.kube/config"
```

```
sudo mkdir /etc/calico

sudo cp calicoctl.cfg /etc/calico/
```

3. Verify calicoctl is properly set up

```
calicoctl get nodes
```

```
ubuntu@kube-master1:~/agilitydocs/docs/class1/kubernetes$ calicoctl get nodes
NAME
kube-master1
kube-node1
kube-node2

ubuntu@kube-master1:~/agilitydocs/docs/class1/kubernetes$
```

4. Set up the Calico BGP config

```
1 apiVersion: projectcalico.org/v3
2 kind: BGPConfiguration
3 metadata:
4   name: default
5 spec:
6   logSeverityScreen: Info
7   nodeToNodeMeshEnabled: true
8   asNumber: 64512
```

```
calicoctl create -f caliconf.yaml
```

5. Set up the BIG-IP BGP peer

```
1 apiVersion: projectcalico.org/v3
2 kind: BGPPeer
3 metadata:
4   name: bgppeer-global-bigip1
5 spec:
6   peerIP: 10.1.1.4
7   asNumber: 64512
```

```
calicoctl create -f calipeer.yaml
```

6. Verify setup

```
calicoctl get bgpPeer
```

7. Change dir back to working lab directory

> ### ⓘ Note
>
> The necessary kubernetes lab files can be found in this directory.

```
cd ..

# or

cd ~/agilitydocs/docs/class1/kubernetes/
```

Confgure BIG-IP for Calico¶

Open firefox and connect to bigip1 management console. For your convenience there's a shortcut on the firefox toolbar.

> ### ⓘ Note
>
> Username and password are: **admin/admin**

1. Enable BGP on route domain 0

a. Connect to the BIG-IP GUI and go to **Network ‣ Route Domains**

b. Click on "0" to open route domain 0

c. Under Dynamic Routing Protocols, move "BGP" from Available to Enabled

d. Click Update

Getting Started   ×   BIG-IP® - ip-10-1-1-4.   ×   +

← → C ⌂   🛡   🔒 https://**10.1.1.4**:8443/xui/?nocache=1595267027185

🔵 Lab Doc   🔵 BIG-IP(10.1.1.4:8443)   ⊕ hello, world   ⊕ mysite.f5demo.com

| Hostname | ip-10-1-1-4.us-west-2.compute.internal | Date | Jul 20, 2020 | User | admin |
| IP Address | 10.1.1.4 | Time | 10:48 AM (PDT) | Role | Administrator |

ONLINE (ACTIVE)
Standalone

| Main | Help | About |

Network ›› **Route Domains** ›› **0**

⚙ ▾   Properties

General Properties

Name	0
Partition / Path	Common
ID	0
Description	

Configuration

Strict Isolation	☑ Enabled
Parent Name	None ▾

	Members:		Available:
VLANs	**/Common** http-tunnel internal socks-tunnel	<< >>	

	Enabled:		Available:
	BGP	<<	BFD IS-IS

Main menu items:
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  - Packet Filters
  - Quick Configuration

Service Policies	▸	Eviction Policy	None	▾
Class of Service	▸			
ARP	▸	Update Cancel		

2. Open a new terminal tab and SSH to BIG-IP

```
# If directed to, accept the authenticity of the host by typing "yes" and hitting Enter to continue.

# passwd = admin

ssh admin@10.1.1.4
```

3. Configure BGP

```
#access the IMI Shell
imish

#Switch to enable mode
enable

#Enter configuration mode
config terminal
#Setup route bgp with AS Number 64512
router bgp 64512

#Create BGP Peer group
neighbor calico-k8s peer-group

#assign peer group as BGP neighbors
neighbor calico-k8s remote-as 64512

#we need to add all the peers: the other BIG-IP, our k8s components
neighbor 10.1.1.7 peer-group calico-k8s
neighbor 10.1.1.8 peer-group calico-k8s
neighbor 10.1.1.9 peer-group calico-k8s

#on BIG-IP 1, run
neighbor 10.1.1.24 peer-group calico-k8s

#on BIG-IP 2, run
neighbor  10.1.1.4 peer-group calico-k8s

#save configuration
write
```

```
#exit
end
```

4. Verify BGP is running

```
show ip bgp neighbors
```

5. Check BIG-IP routes

```
exit # Exit Zebos first
```

```
route
```

```
[admin@ip-10-1-1-4:Active:Standalone] ~ # route
Kernel IP routing table
Destination       Gateway          Genmask          Flags Metric Ref    Use Iface
default           10.1.1.1         0.0.0.0          UG    0      0        0 internal
default           10.1.1.1         0.0.0.0          UG    9      0        0 mgmt
10.1.1.0          0.0.0.0          255.255.255.0    U     0      0        0 internal
10.1.1.0          0.0.0.0          255.255.255.0    U     9      0        0 mgmt
10.244.0.0        10.1.1.7         255.255.255.255  UGH   0      0        0 internal
10.244.0.0        10.1.1.7         255.255.255.0    UG    0      0        0 internal
10.244.1.0        10.1.1.8         255.255.255.255  UGH   0      0        0 internal
10.244.1.0        10.1.1.8         255.255.255.0    UG    0      0        0 internal
10.244.2.0        10.1.1.9         255.255.255.255  UGH   0      0        0 internal
10.244.2.0        10.1.1.9         255.255.255.0    UG    0      0        0 internal
10.244.9.64       10.1.1.8         255.255.255.192  UG    0      0        0 internal
10.244.102.64     10.1.1.7         255.255.255.192  UG    0      0        0 internal
10.244.233.192    10.1.1.9         255.255.255.192  UG    0      0        0 internal
127.1.1.0         0.0.0.0          255.255.255.0    U     0      0        0 tmm
127.7.0.0         tmm-shared       255.255.0.0      UG    0      0        0 tmm
127.20.0.0        0.0.0.0          255.255.0.0      U     0      0        0 tmm_bp
[admin@ip-10-1-1-4:Active:Standalone] ~ #
```

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/csp/site-feedback)