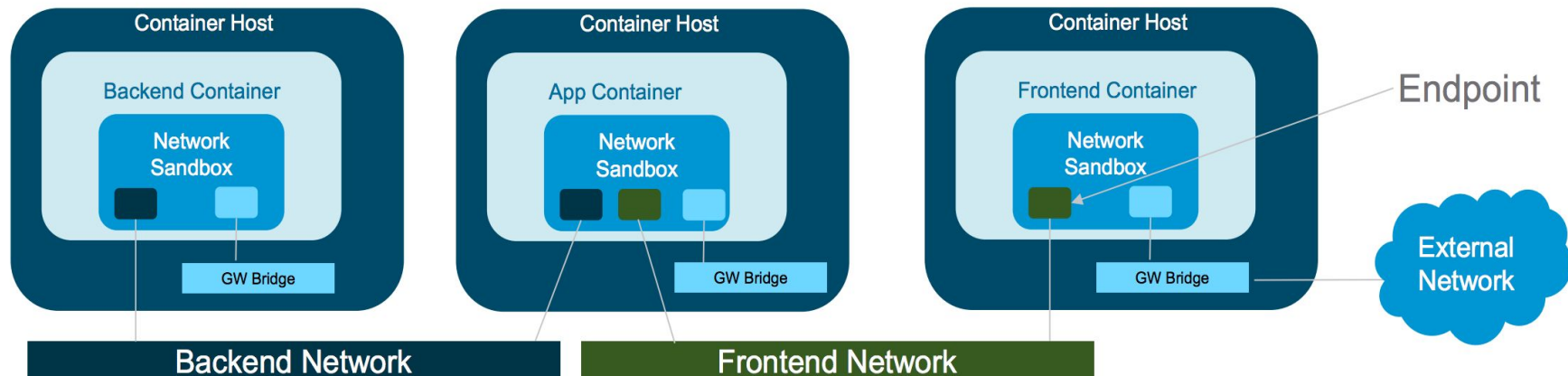


# Digging deep into docker

(Networking)

# Container networking high-level diagram



# Before jumping into docker networking internals..

- Network namespace - primer
- Virtual network interface - primer
- Iptables - primer

# Responsibilities of container networking layer

- IP connectivity in Container's network ( Linux network namespace, FreeBSD Jail or similar concept )
- IP address management ( IPAM )
- Network device creation etc.
- External connectivity via Host NAT

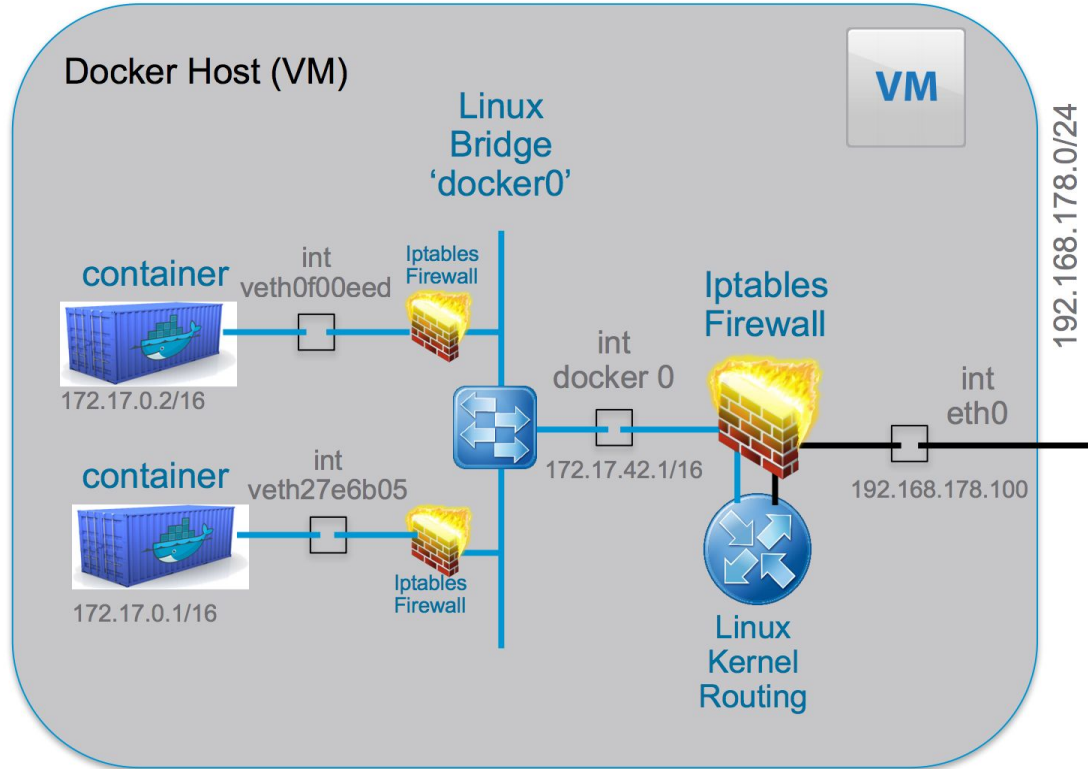
# Design requirements of container networking layer

- Should be usable on any underlying data center tech ( on-premise / public )
- Should be pluggable to any kind of underlying networking solution that can be abstracted with EndPoints, SandBox and Networks. ( mentioned on previous slide )
- Should leave the choice of implementing these things to network vendors via plugin / driver model

Implementation of these networking layers are

- CNM ( Container networking Module ) - docker and only docker
- CNI ( Container networking Interface ) - everyone else

# Docker engine - default network diagram ( Bridge )



# Different network drivers

- Bridge - Single Host. Explained in Previous slide. Very relevant for local development
- Overlay - Multi Host. Used in Docker Swarm.
- Macvlan - Single Host, but light weight than Bridge, as it directly connects to physical network interfaces on host.

# Further study topics

- Kubernetes networking with Pod and flat network space
- Mesos networking
- Service discovery in the world of containers
- Reverse engineering ECS containers ( as it's not open sourced, you have to ssh into container instances and run few linux commands to explore )



# Few useful network commands

- ip link
- brctl
- netns
- nsenter
- ps
- docker :)
-

# References

- [http://securitynik.blogspot.in/2016/12/docker-networking-internals-how-docker\\_16.html#Overview](http://securitynik.blogspot.in/2016/12/docker-networking-internals-how-docker_16.html#Overview) ( docker networking demo )
- <http://www.axeman.in/blog/2014/12/09/build-your-own-lxc-contain-it-yourself/> ( build your own container by linux command demo )
- <https://www.digitalocean.com/community/tutorials/how-the-iptables-firewall-works> ( iptables primer )
- [http://events.linuxfoundation.org/sites/events/files/slides/2016%20-%20Linux%20Networking%20explained\\_0.pdf](http://events.linuxfoundation.org/sites/events/files/slides/2016%20-%20Linux%20Networking%20explained_0.pdf) ( virtual interfaces and linux networking demo )
- <https://blog.docker.com/2016/12/understanding-docker-networking-drivers-use-cases/> ( docker networking drivers details )
- <https://thenewstack.io/hackers-guide-kubernetes-networking/> ( kubernetes networking reverse engineering )
- <http://www.innervoice.in/blogs/2013/12/02/linux-bridge-virtual-networking/> ( linux bridges )
- <https://github.com/kubernetes/community/blob/master/contributors/design-proposals/network/networking.md> ( kubernetes networking and CNI )
- <https://platform9.com/blog/container-namespaces-deep-dive-container-networking/>
- <https://blog.scottlowe.org/2013/09/04/introducing-linux-network-namespaces/> ( linux network namespace tutorial )