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Software Defined Networking for illumos

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Software Defined Buzzword

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- Set up infrastructure once
- Modify it without connecting to every LOM or serial console in the building
- Extend and create OS abstractions as necessary

Problem Background

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- **Network Isolation (network multi-tenancy)**
- **Address space control**
- **VLANs**
  - Annoying to Program
  - Limited Number
- **Building blocks for network services**
- **Avoid magic hardware**

Industry Trends - Consensus

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- **Encapsulation Formats**
  - NVGRE
  - VXLAN
- **Broadcom Trident II ASICs**
- **Intel 40 GbE Cards**

Industry Trends - Anarchy

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- **100 different ways to manage it**
  - Openflow
  - VMware Nicira
  - Plumgrid
  - Userland software (Weave, etc.)
  - Hardware (Pluribus, Cumulus, etc.)
- **Anarchy in management suggests illumos needs flexibility here**

Enter Overlay Devices

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- **New dladm overlay device**
- **Created on top of zones L3 netstack (generally)**
- **Create VNICs and the like on overlay devices**
- **Two main pluggable components**
  - Encapsulation (kernel)
  - Lookup (userland)

High level Architecture

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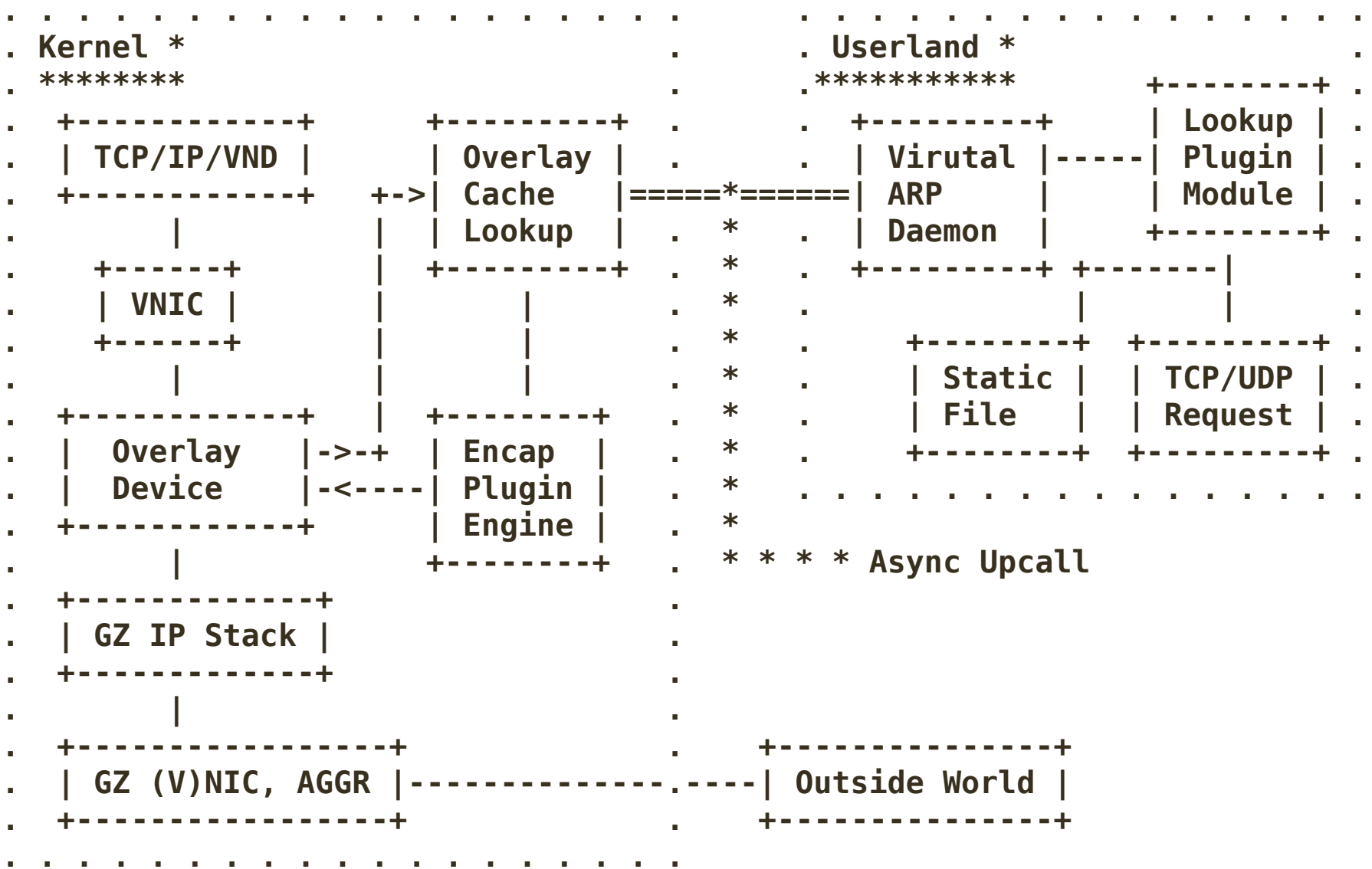

Overlay driver

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- **GLDv3 driver**
- **Notion of an encapsulation id**
- **Pluggable encapsulation modules**
  - Per-module properties
- **Two destination modes**
  - Point
  - Dynamic
- **vxlan already implemented for this**

Virtual ARP Daemon - varpd

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- **Userland side of an overlay device**
- **Door server for libdlmgmtd**
- **Talks to kernel over an ioctl interface**
  - Kernel treats varpd like IP does ARP, expects it can fail
- **Implements lookups in pluggable backends**
- **Support for injecting packets into the devices**
  - Useful for proxy ARP, NDP, etc.
  - Dropping packets

varpd backends

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- **Shared objects that implement an ops vector**
- **Define lookup mode**
- **Define supported destination types**
- **Define properties**
- **Two current prototype backends:**
  - Direct – Point to point
  - Files – Glorified /etc/ethers

Demo

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Along for the Ride

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- VNIC MTU modification (already in the gate)
- vxlan decoding in snoop
- libidspace – user version of id_space interfaces
- librename – persistent atomic file renames
- re-entrant ethers(3SOCKET) functions
- Direct callbacks for ksockets
- UDP ksocket sendmblk support
- mpt_sas refhash made generic

Futures

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- **dlmgmtd persistence**
- **Performance**
- **Dynamic resize of the kernel target table**
- **Experimenting with distributed systems as plugin backing stores**
- **Better observability**
  - DTrace, snoop, dumping target table

Take it Home Today

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- **Code at:** https://github.com/joyent/illumos-joyent/tree/dev-overlay
- **Current dev snapshot:** http://dtrace.org/blogs/rm/2014/09/23/illumos-overlay-networks-development-preview-02/

Thanks

Joyent

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