

Wicked Trip Into Wicked Network Management

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Some Words of Encouragement

There is a theory which states, that if ever anybody discovers exactly what the Universe is for and why it is there, it will instantly disappear and be replaced by something even more bizarre and inexplicable.

There is another theory which states that this has already happened.

Douglas Adams

Back In 1992, The World Was Flat

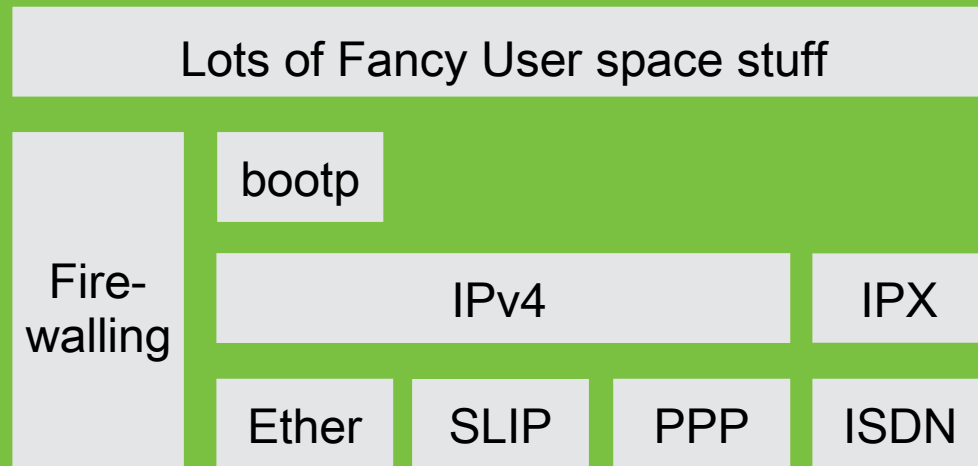
Mail

Usenet

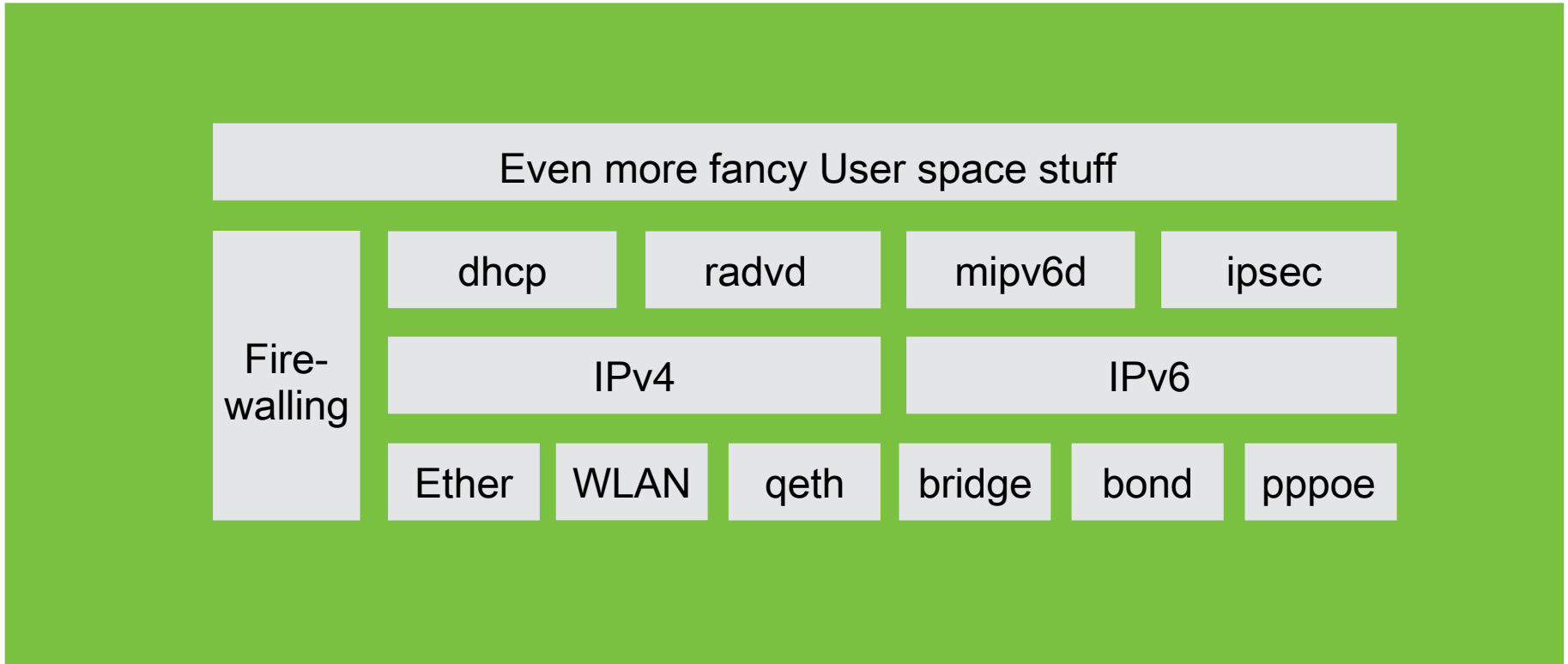
UUCP

Expensive Modem

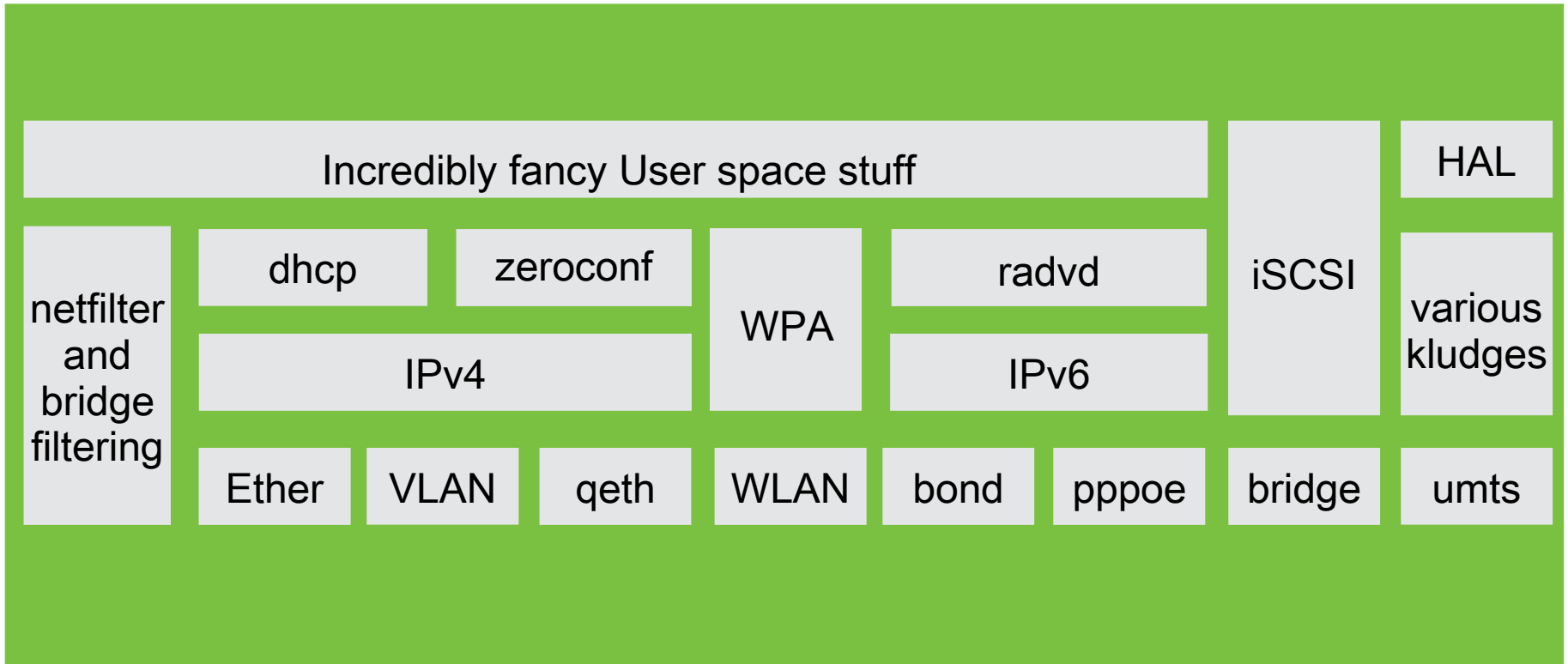
Five Years Later, We Had IP Networking



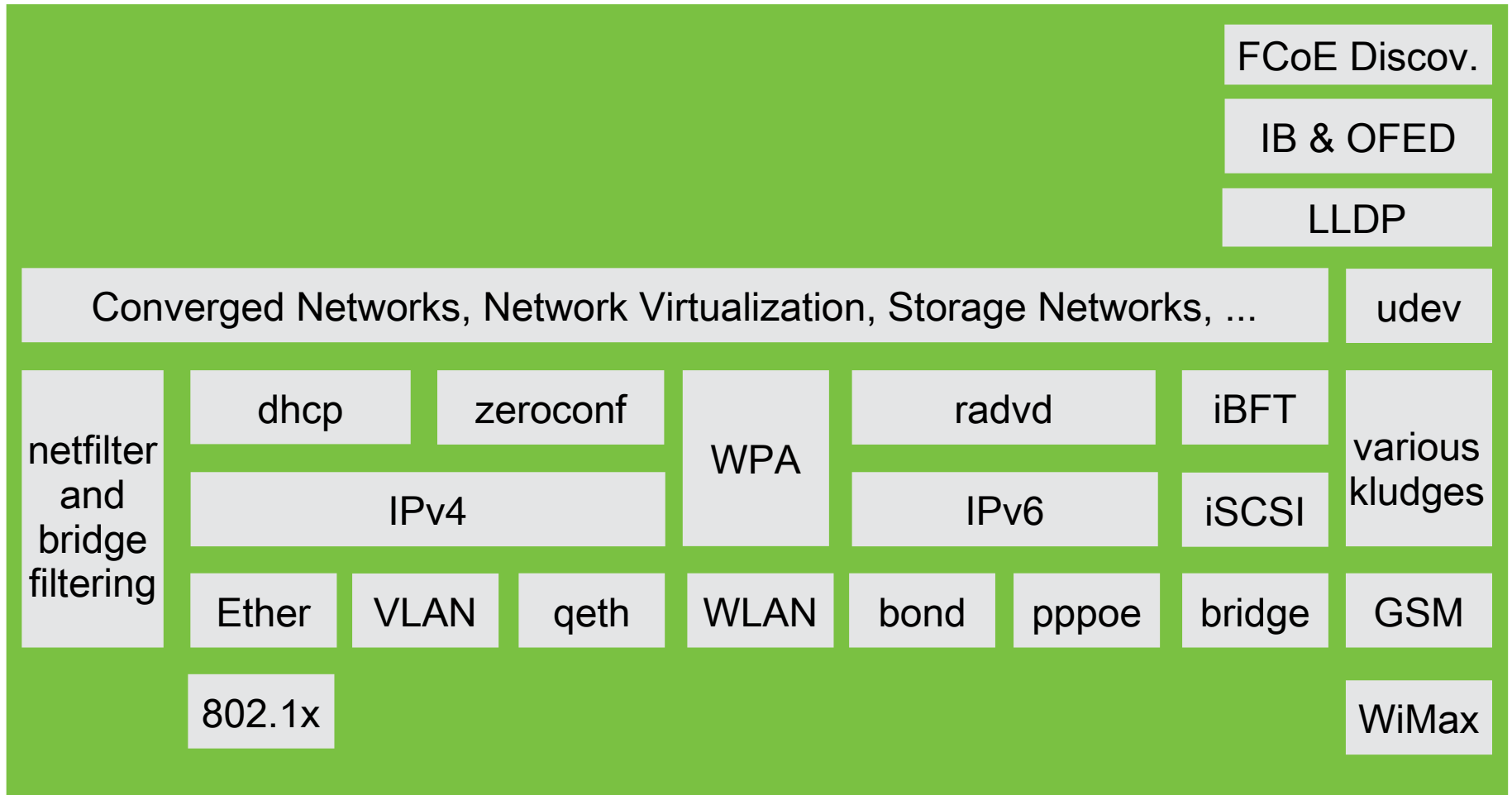
In 2002, We Got IPv6



2007: Mobility and Data Center Diverge



2012: The Universe Changed Again



Agenda

- What we want to achieve
- About Wicked
 - Wicked history
 - Implementation decisions
 - Compents
 - Supporting Migration
- Object Model and Layering

What We Want To Achieve

- Goal
 - Cope with increasingly complex configurations
- Target Audience
 - Data Center and End Users
- Positioning
 - Network configuration is a service
- Usability
 - Make adoption as smooth as possible

What We Want To Achieve (cont.)

Technical Attributes

- Architecture-independent
- Extensible
- Needs small footprint (initrd use)
- React flexibly to network changes
- Broadcast event notifications
 - interface comes up, IP address assigned, routing changed

What We Don't Want To Achieve

- Replacing NetworkManager completely
- World domination
(aka locking users into a specific tool set)

Wicked History

- Started as a hack week project for network monitoring
- Morphed into “try to do better than ifup”
- Original design was based on a REST interface
 - Worked, but ...
- Second Iteration moved to a dbus interface
 - Much better, but a bit of a learning curve

Implementation Decisions

- Client / Server model
 - Dbus Service (provided by a daemon)
- Layered architecture
 - providing separate Dbus interfaces
- Structured configuration files
 - XML for now
- Stateless (mostly)
- Extensible
 - Server can be extended with scripts

Components

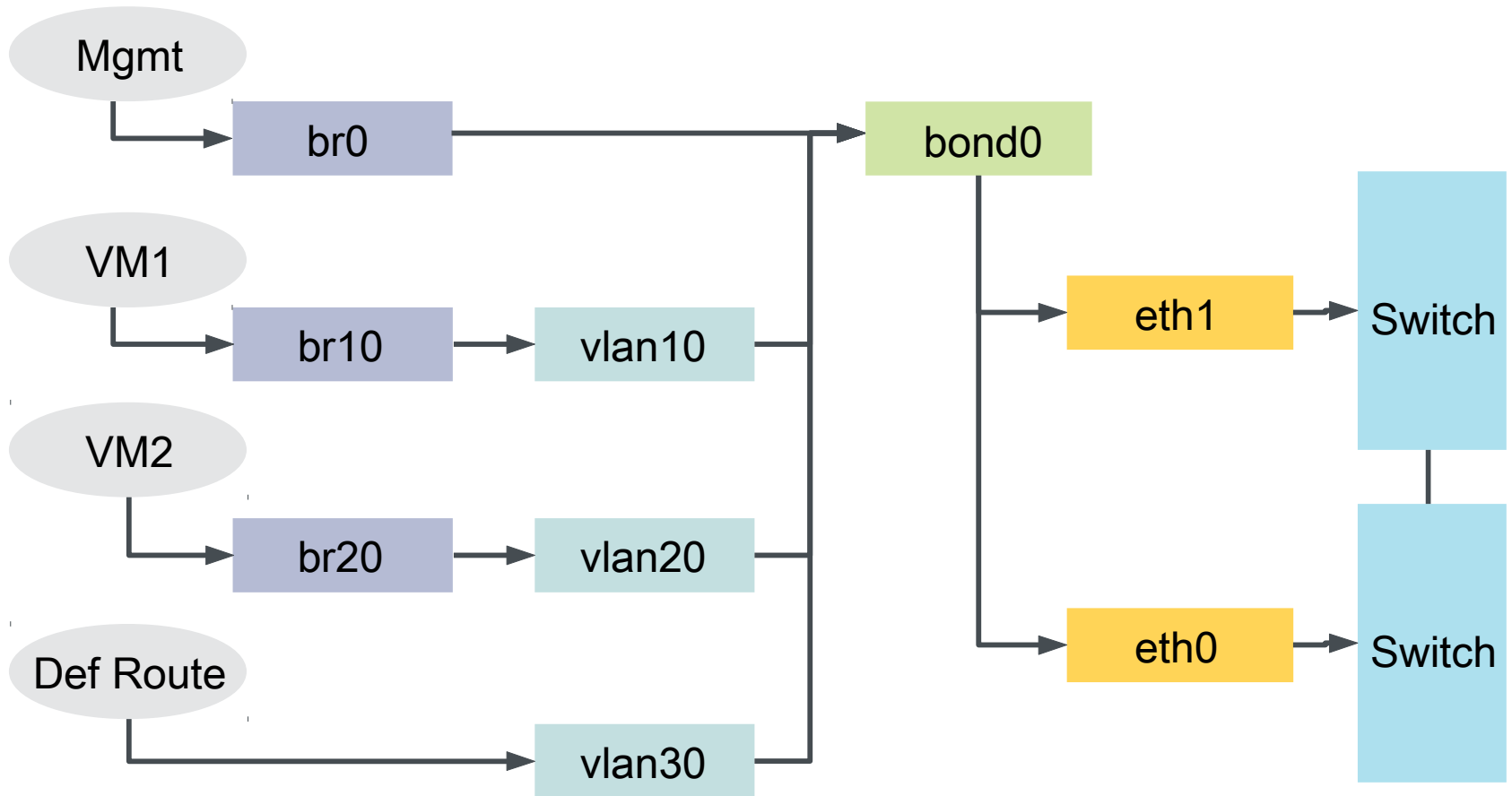
- wickedd, the server process
- wicked command line utility
- dhcp4, dhcp6 and other supplicants
- network-nanny (support interface hotplugging)

Supporting Migration

- Existing Configuration files
 - wicked client can read ifcfg files (both the green and the red flavours)
 - Plan to provide ifup wrapper scripts
- Testing
 - Conflict as little as possible with existing infrastructure
 - Just drop in and test

Example – Virtualization

Virtualization Host, Simple Case



Object Model and Layering

Wicked Object Model

- The central DBus objects are network interfaces
 - /org/opensuse/Network/Interface/*
- Each object supports a set of DBus “interfaces”
 - Unfortunately, we're overloading the term interface a bit
 - which is why we will refer to network *devices* subsequently
- Many DBus interfaces are generic, but some are specific to the device type
 - Ethernet, loopback, VLAN virtual device, etc

Wicked Object Model cont'd

- Network device object naming based on the kernel's interface index
 - /org/opensuse/Network/Interface/<ifindex>
 - pro: invariant against interface renames
 - con: no object without existing device (you need factory functions to create virtual devices for VLANs, bridges, bonds)

Wicked Object Model cont'd

- Dbus interfaces are named `org.openSUSE.Network.*`
 - Heavy use of polymorphism to simplify the code
- `org.openSUSE.Network.<DeviceType>`
for device-specific ones, like Ethernet, VLAN
 - they all export a “changeDevice()” method,
taking a Dbus dict as argument
- Generic interfaces supported by all network devices,
such as `org.openSUSE.Network.Interface`

Wicked Object Model cont'd

- 1:1 correspondence between DBus interfaces and sections of a config file
 - Simplifies the client side code significantly
 - Simplifies extending the supported configuration options

Wicked Object Model

example

Ethernet device

DBus Interface

org.opensuse.Network.Ethernet

org.opensuse.Network.Interface

...Addrconf.ipv4.static

...Addrconf.ipv6.static

...Addrconf.ipv4.dhcp

...Addrconf.ipv6.dhcp

DBus methods

changeDevice

linkUp,linkDown

requestLease,dropLease

requestLease, dropLease

requestLease, dropLease

requestLease,dropLease

Example: Address Configuration

```
<interface>  
  <name>eth0</name>  
  <ipv4:dhcp>  
    <enabled>true</enabled>  
  </ipv4:dhcp>  
</interface>
```


Example: Link Settings

```
<interface>  
  <name>eth0</name>  
  <link>  
    <ipv4>  
      <forwarding>on</forwarding>  
    </ipv4>  
    <mtu>1200</mtu>  
  </link>  
  ...  
</interface>
```

Example: Tweaking Ethernet Settings

```
<interface>  
  <name>eth0</name>  
  <ethernet>  
    <offload>  
      <tso>disable</tso>  
      <!-- same for gso, ufo, lro, ... -->  
    </offload>  
  </ethernet>  
  ...  
</interface>
```

Summary

Current Status

- Implemented
 - Device types: Ethernet, VLAN, Bridging, Bonding
 - Address configuration: static, dhcp4, dhcp6, IPv4 zeroconf
- In implementation
 - Wireless (using wpa-supPLICANT)
 - ibft
 - built-in lldp support
- On the roadmap:
 - tunneling (IPv6 tunnels, openvpn)
 - Documentation improvements
- It will be in openSUSE 13.1

Try it

<https://build.opensuse.org/project/show/network:wicked:master/>

Clone it

<https://github.com/openSUSE/wicked>

Your Questions!?





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