The Road to the Open Network
a story about networks, applications, and abstractions

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Preface:
The Nature of Open Networking
open device?
software-defined device?
Putting the network back in Open Networks

... or Software-defined Networks
What makes this “open”?

- Ability to implement a desired ephemeral and/or configured state
- Regardless of how that desire is specified
- Independent of how the implementation is manifest

How do we describe the desired intent of this system?

This is about raising the abstraction
Chapter 1: Describing Intent
Intent

- Defines the desired state of a system
  In this case, the applications running on the network

- Applications can describe their intent
  Connectivity quality (e.g. bandwidth, latency, jitter, etc) between application components or between application and other systems

- Organizations can describe their intent
  What users/departments/applications/etc should be able to perform certain communications actions
  Desired business logic - availability (9 5’s or 5 9’s?), compliance (HIPAA, PCI), governance
Chapter 2:
Affinities
What are Affinities?

- Describes relationships between components in a system
- And attributes of those relationships
- We’ve always had them
- Just never made them the basis of how we describe the network formally
Affinity as a 'lingua franca'
Chapter 3:

Short t’s
How do we keep 't' short?

Ans: make 'r' long by abstracting

Chapter 4:

A Tale of Two Extremes
A Tale of Two Extremes

Legacy Applications

Application intent ‘hard coded’ to network via CLI commands, config files, VLAN memberships, QoS settings, etc.

Google’s “Borg”

Infrastructure as a “task scheduler”; homogenous applications; embedded meta-data

is there any in between?
The in-between

Encapsulate non-homogeneous applications in metadata derived from policy - in a common, open way.
Chapter 5:
Prof. Dijkstra and Radical Novelties
On the cruelty of really teaching computing science

The second part of this talk pursues some of the scientific and educational consequences of the assumption that computers represent a radical novelty. In order to give this assumption clear status, we have to be much more precise as to what we mean in this context by the adjective "practical". We shall do so in the first part of this lecture in which we shall furthermore supply evidence in support of our assumption.

Lesson's from Prof. Dijkstra

good read: http://www.cs.utexas.edu/~EWD/ewd10xx/EWD1036.PDF
“Radical novelties are so disturbing that they tend to be suppressed or ignored, to the extent that even the possibility of their existence is more often denied than admitted.”

– Professor Edsger Wybe Dijkstra
Lesson 1: Radical Novelty

- Is the modern computer something like the typewriter, just bigger, faster, and more flexible?
Lesson 2: The Purpose of Programs

“After all, it is no longer the purpose of programs to instruct our machines; these days it is the purpose of machines to execute our programs.”

– Professor Edsger Wybe Dijkstra
Learning from Dijkstra

- We need to consider that Open Networking / SDN could be a “radical novelty” - a sharp discontinuity in networking.

- The network does not exist to be programmed.
  - It exists to effect the desired ephemeral and configured state defined by the surrounding application systems.

- We do this by abstracting the underlying system and mapping to the contours of the users of the network.
Prologue:

And now, a word from our sponsor
Plexxi and the Open Network

- Affinities driving a DC infrastructure - available today for purchase from Plexxi

- Affinities for ODL: Initial code in Hydrogen, scope and functionality to be expanded in subsequent releases. Partners looking to leverage include Cisco, Insieme, IBM and Radware.

- Affinities for OpenStack: Next up. Leveraging work above.

- Affinities for All: Affinities are like air, its for everyone - If you want to do something with it, let us know, we’ll help!
Thank You

for more, visit us at http://www.plexxi.com/blog
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