A Knowledge Plane for the Internet

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Our Position:

- It is time to take what is good about the Internet, and build a new sort of net that fixes what is wrong with the Internet.
Right and wrong

■ What is right: delivering data (when it works).
  ■ Transparent packet carriage.

■ What is wrong:
  ■ It cannot tell when an application is not working.
  ■ It requires the operator to design and build at a very low level.
A net that can build itself

High level specs:
Goals and constraints

Network (re)builder

Details
Continuous rebuilding

High level specs: Goals and constraints

Changes in requirements, observed operations, external conditions.

Network region
Network (re)builder
Network observer

Details Status

Network region
Network region
Network region
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Network region
Help people understand…

High level specs:
Goals and constraints

Details Status

Network (re)builder
Network observer

Person

Network region
Network region
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Network region
Composition from parts

High level specs:
Goals and constraints

Network (re)builder
Network observer
Region composer

As regions join, they negotiate to determine mutual constraints, which may trigger rebuilding.
Explain/fix problems

High level specs:
- Goals and constraints

Network (re)builder
- Network observer
- Region composer
- Network region
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High level problem assertion:
- Fixit!

High level operational characterization:
- “Success story”!

Design specs

Problem resolver
- Network explainer

Your region composer

Details Status

Negotiation
Link lower and higher levels

High level specs: Goals and constraints

Design specs

High level operational characterization: “Success story”!

Network (re)builder

Network observer

Region composer

Network region

Problem resolver

Network explainer

Region composer

Network region

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The Knowledge Plane

High level problem assertion: Fix it!

Network (re)builder
Network observer
Region composer
Network region
Negotiation
Design specs

High level specs: Goals and constraints

High level operational characterization: “Success story”!

Problem resolver
Network explainer

Details Status

Network region
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Review: we call for:

- An net that builds itself using high-level specification.
- A network that can translate a high-level assertion that something is wrong into:
  - A fix
  - An explanation
- This is a very different net from the Internet.
  - We might experiment with knowledge overlays, but…
  - Example: silent errors
What is different?

- Edge-involvement.
  - Visibility of “application-level” behavior.
- Global perspective.
- Compositional structure.
- Unified approach.
- Cognitive framework.