

# Trials and Tribulations

## Community Experiments Towards a Next-Gen R&E Infrastructure

Tech Exchange 2017  
John Moore - Internet2  
Bill Owens - NYSERNet

# Agenda

Introduction to the effort

Disaggregation

Key Challenges and Questions

Core Tech Evaluation Trial

# Introduction to the effort

# Key principles

Developed from community requirements gathering process

1. ***Ecosystem*** - planning, service development and investment should proceed in an integrated fashion amongst ecosystem members (campuses, regionals, NRENs, etc.)
2. ***Experimentation*** - development of the integrated infrastructure (ecosystem) should take place as a community-wide continuous development process
3. ***End User Experience*** - *Follow leading use cases and examples that enhance the user's end to end experience*

*Points to the need for coordinated, community experimentation efforts*

# Architectural constructs

Developed from community requirements gathering process

## 1. *Hollow Core*

- Drive down cost per bit radically
- Simple, high bandwidth, scaled to community needs

## 2. *Flexible Edge*

- Highly programmable network, compute, storage
- Flexible - configurable to support needs wherever “edge” is
- Geared to support discipline research, experimental testbeds and academic enterprise needs

*Approach very much in-line with ESNet conclusions - see Chin Guok's slides at <https://tnc17.geant.org/getfile/3743>*

# Developing an action plan

- Goal: gain experience *as a community* with the technologies and collaborations that will allow us to serve our evolving needs
- Technology evaluation - start with Core
  - Evaluate current state of packet/optical, choose candidate technologies/products, test in lab & in situ, make informed analysis of where capabilities will be in 2 years
  - Focus on disaggregated solutions first
- Develop a model of deeper collaboration within the ecosystem
  - Pick candidate service, develop joint deployment and ops plan
  - Evaluate impact on business models, investments, etc.
- Technology evaluation phase 2 - Edge
  - Develop key technology partners - community members working in this space, industry, etc
  - Evaluate current state, choose candidate technologies/products, test in situ, make informed analysis of where capabilities will be in 2 years

# Disaggregation

# Transport Disaggregation

## Partial disaggregation model

- Open Line System - current systems that support Dark Channels / Alien Waves fit nicely into this model
- Interdomain OLS will get interesting - open source modeling software would be nice

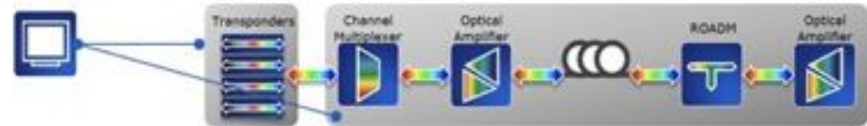
- No Disaggregation: Entire transport network acts as one element



- Fully Disaggregated: Everything is a separate network element



- Partially: Transponding is one element, OOLS is second.





# Disaggregation and support

Fully Disaggregated



Fully Aggregated

Open Hardware Open Software Full vendor support (integrator)	Open Hardware Open Software NetDevOps management & support
Proprietary Hardware Proprietary Software Full vendor support	Proprietary Hardware Proprietary Software NetDevOps management & support

More vendor support ← → More operator support

If we move towards upper right quadrant, how do we prepare?

- Training and recruiting - start now!
- Leverage open web-scale communities - TIP, etc.
  - How do we organize as R&E?

# Telecom Infra Project

*Founded February 2016, the Telecom Infra Project, Inc. (TIP) is an engineering-focused initiative driven by operators, suppliers, developers, integrators, and startups to disaggregate the traditional network deployment approach*

- One important example of the web-scale operators being open about how they build their infrastructures, and trying to build an open community around those ideas
- Sample projects - Open Optical Packet Transport, Edge Computing, People and Process, etc.
- [telecominfraproject.com](http://telecominfraproject.com)

Bill Owens  
Core Technology Evaluation

Voyager transponder with 12 QSFP28 ports and 4 x200G DWDM line ports.



# Questions to consider

How far down this disaggregation road do we want to go?

Do we (the R&E community at large) want to participate in community building efforts driven by the web-scale operators? Can we benefit & contribute?

How can we move towards a more integrated end-to-end service delivery model for the core?

What kind of functions should we support at the edge to better serve our research users?

Thanks!

[jmoore@internet2.edu](mailto:jmoore@internet2.edu)

[owens@nysernet.org](mailto:owens@nysernet.org)