The Right Stuff
of Tahoe, Incorporated

As a Matter of Fact, We ARE Rocket Scientists™

Connection Foundry™

Software for cross-layer optimization of networks
Synthesizes and analyzes graph-theoretic topologies
Best-of-breed algorithms, computational connectivity

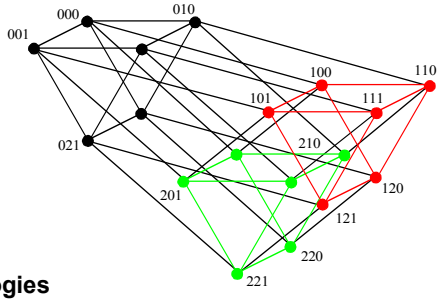
Connection Foundry™ empowers

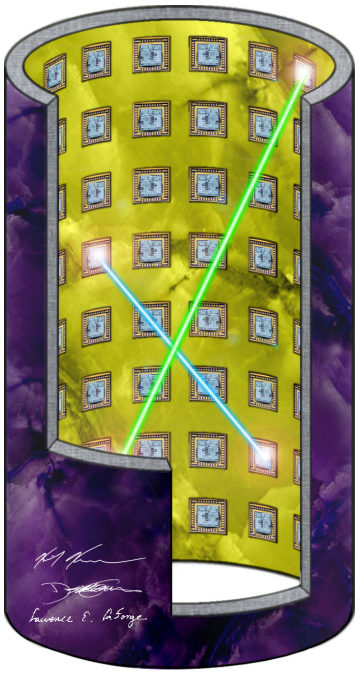
- **Network architects**
- **Designers of multicomputers**
- **Security and threat analysts**

Connection Foundry™

- **Outgrowth of NASA-sponsored research**
- **Expert system, graphical user interface**
  - **Algorithmically applies state-of-the-art theorems**
  - **Multivariate optimization of connectivity: wired and wireless topologies**
    - **Maximize tolerance to failures**
      - **Worst-case or probabilistic**
    - **Minimize the cost of connection**
      - **Wires, pins, or wireless channels**
    - **Minimize**
      - **Broadcast latency (radius)**
      - **Worst-case hop latency (diameter)**

Hamming-routable topology synthesized by Connection Foundry™



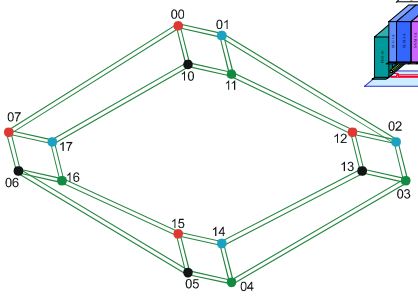


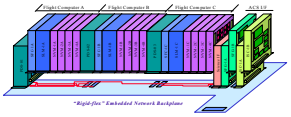
Network-based multicomputer designed for interstellar missions. Connection Foundry™ synthesis implemented with free-space optical interconnect. (Client: NASA Institute for Advanced Concepts.)

By definition, the multicomputer system on which *you* depend is *mission critical*. Which is why you should depend on Connection Foundry™. Unlike try-and-see simulators, Connection Foundry™ applies *mathematical rigor* to synthesize self-diagnosing, self-configuring architectures. In addition to minimizing the connectivity cost and latency of networks and bus structures, Connection Foundry™ can help reduce payroll and schedule delay.

Topological synthesis trumps hand-crafted design

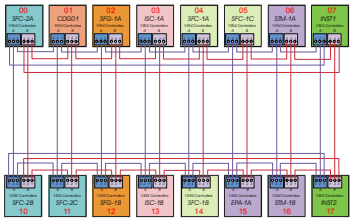
The examples below illustrate how Connection Foundry™ tunes the topology of networks and bus structures over a *range* of optima: latency, fault tolerance, throughput, and channel cost. As processor count increases, the benefits of Connection Foundry™ emerge as ever more compelling. (Client: NASA / Jet Propulsion Laboratory)



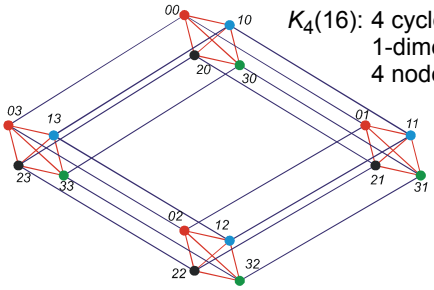


Rigid-flex MCM backplane

Suboptimal connectivity devised by hand: result of two months' work by engineers at the Jet Propulsion Laboratory

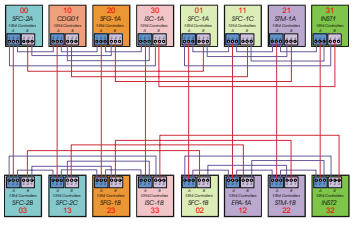


NASA's X2000 avionics, original connectivity proposed.
5 ≤ quorum radius ≤ quorum diameter ≤ 8.
Fault tolerance = 2. Cost: 6 channels per node.



$K_4(16)$: 4 cycles of 4-ary 1-dimensional K-cubes, 4 nodes per cycle

Network topology synthesized by Connection Foundry™



At 5 channels per node, less costly than the original at left, but with improved quorum latency 3 = radius ≤ diameter ≤ 4, and *best possible* fault tolerance = 4.

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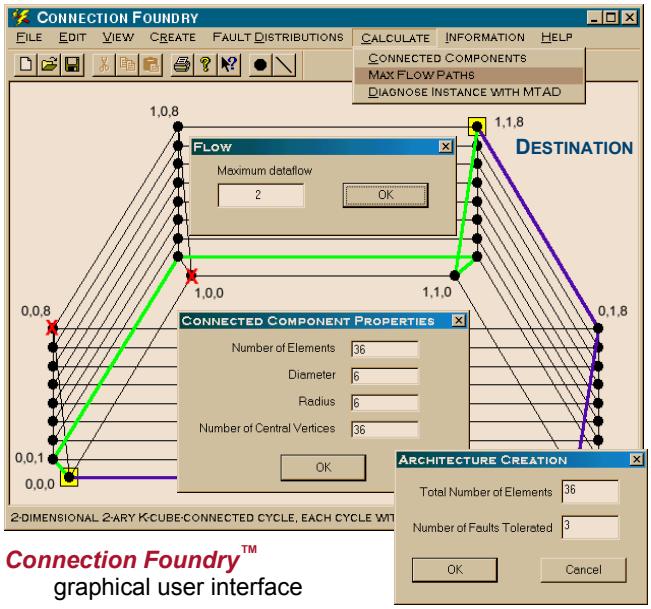
Connection Foundry™

Software for cross-layer optimization of networks
Complements simulators such as ns-2 and OPNET
Architectures for self test, autonomous diagnosis

Connection Foundry™ synthesizes and analyzes topologies where you have maximum leverage: interconnection of nodes. The *same* connections that maintain fault-tolerant connectivity at minimum cost can reduce latency – *if*, that is, you know how to hook things up. Connection Foundry™ is *your* expert!

Topology: cornerstone of cross-layer optimization

Cross-layer network optimization combines graph theory with data link and physical parameters, such as signal-to-noise, Shannon limits, and coding efficiencies. Connection Foundry™ is an essential foundation for high fidelity simulations, such as those obtained using ns-2. Before Connection Foundry™, you would compose a design, simulate for quality of service, revise the design, and simulate again. These iterations are time-consuming and expensive. And you never *really* know how close you have come to the best that Nature will allow. That's why you should use Connection Foundry™ *first*. With Connection Foundry™, you *know* that your network enjoys a scientifically solid foundation, optimized for topology.

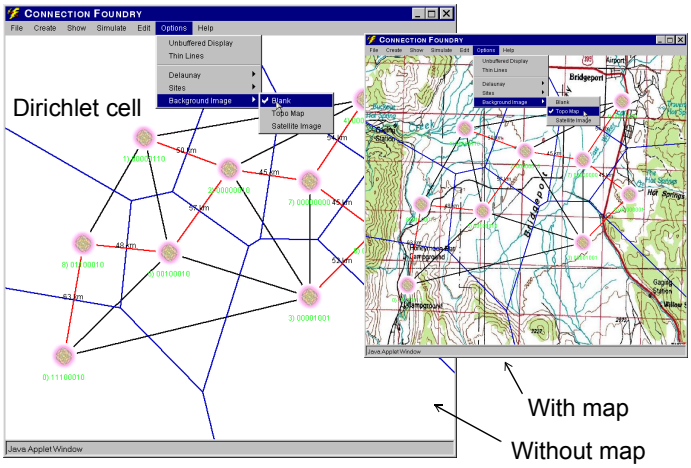


Connection Foundry™
graphical user interface

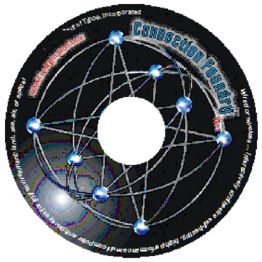
Above: input the number of nodes and the number of faulty nodes that you need to tolerate. Connection Foundry™ synthesizes and analyzes your topology.

Example application: MANETs

Advances in wireless technology fuel the impetus for self-organizing mobile *ad hoc* networks (MANETs) that conserve spectrum, minimize latency and channel power, and maximize fault tolerance and throughput.



Above: Cross-layer optimization of topologies respecting constraints on geometry, as well as radio-frequency transmit and receive power. Connection Foundry™ implements Voronoi algorithms to compute the Dirichlet-cell dual: *the Delaunay triangulation*. The benefit: wireless networks whose nodes dynamically re-configure *elastically* optimum channels. (Client: Department of Homeland Security)



New for version 2.1

Implementation of the fastest algorithm for Hamming labeling a topology. Hamming labeling is key to achieving the fastest possible distance-vector routing and switching of network packets. (Client: Missile Defense Agency)

Connection Foundry™ 2.1	Product ID RST-00-038	Software for Microsoft Windows. Twelve-month lease, one seat.	$1200.00	S & H at no charge

- Place orders to OrderStuff@The-Right-Stuff.com
- Or phone us at 1.775.322.5186

We invite enquiries from corporations, government organizations, and distributors.

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