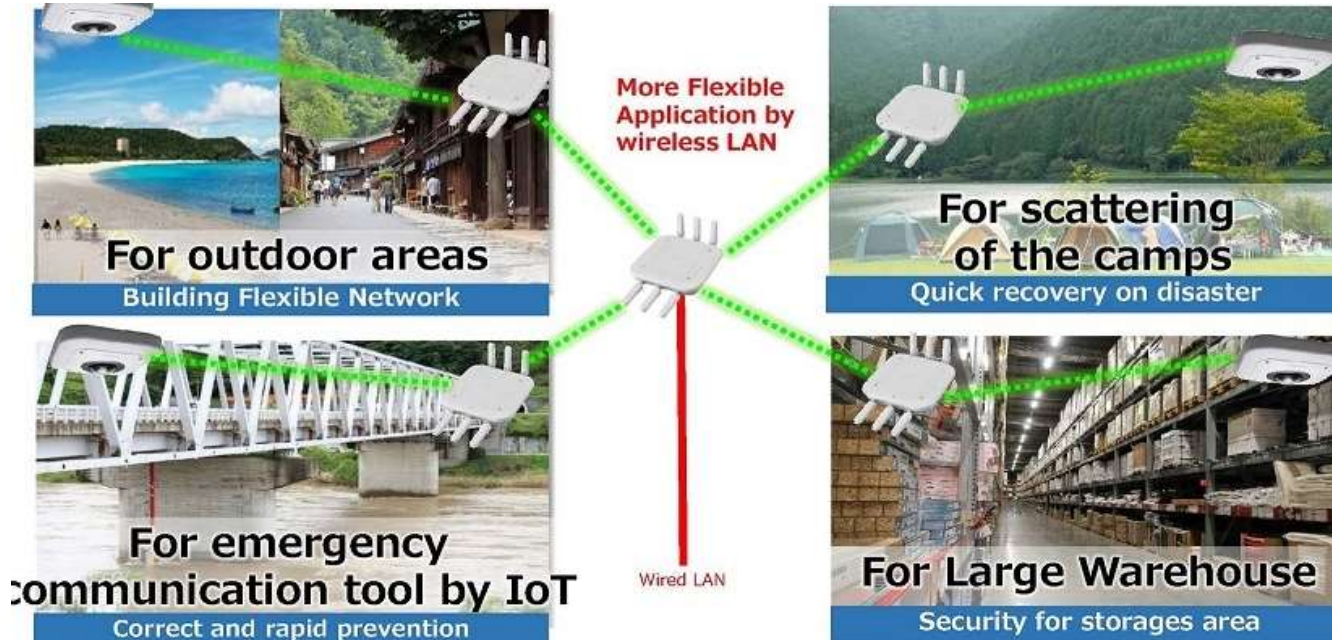


Over the past decade, Meshdynamics has supplied customized versions of our mesh networking software to OEMs: numerous military contractors, industrial mining equipment manufacturers and industrial network equipment manufacturers. [Customers](#)

Some representative applications shown below (Courtesy Sharp Electronics, Japan)



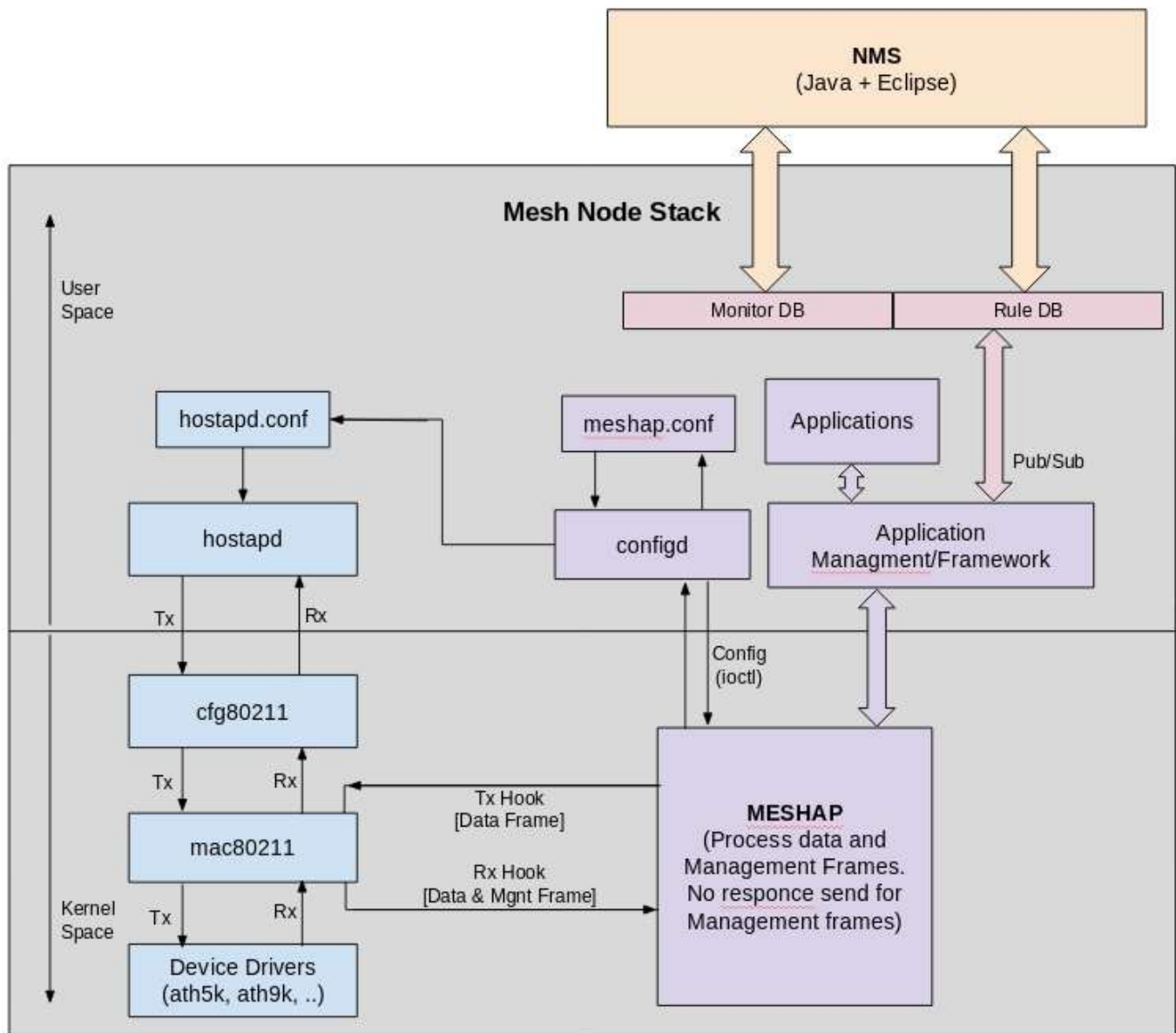
The core mesh software was ported to run on boards (processors) and radios of the customer's choosing. Meshdynamics system integrators, working directly with the OEM licensee, developed the finished mesh-enabled product. The intellectual property and trade secrets related to their products was thus preserved as a separate software tree.

Post 2014, Meshdynamics developed and field tested MeshSuite™ modules to accelerate time to market for OEMs requiring mesh network connectivity to be baked into their connected product offerings. Modules include simulation and test automation tools specific to mesh networking and source code for exemplary board-radio ensembles

Patented technology, licensed with MeshSuite includes:

- Dual Radio meshed backhaul with [proven scalable performance](#).
- User level publish-subscribe messaging for apps. See Confluence pages for more
- Logical Radios– dynamically assign logical radio modes to [multi-radio](#) or [single -radio](#)
- Dynamic configuration of “[Model number](#)” based on changing environment
- Disruption Tolerant – e.g. proactive fail over, no packet loss. [DTN](#) [Hospital](#)
- Test bed in a box -- with real and virtual mesh nodes and “app” framework.
- Access to experienced system integrators – accelerated time to market.

[Collaborations Welcomed](#) [Dynamic Tree Topologies](#) [Self Classified Chirps](#) [Smart Simulations](#)



The architecture includes Mesh Networking algorithms (meshap) and an application framework.

The Mesh Networking architecture defines a design approach where the proprietary Mesh Networking algorithm will be fully integrated with the Linux based mac80211 architecture.

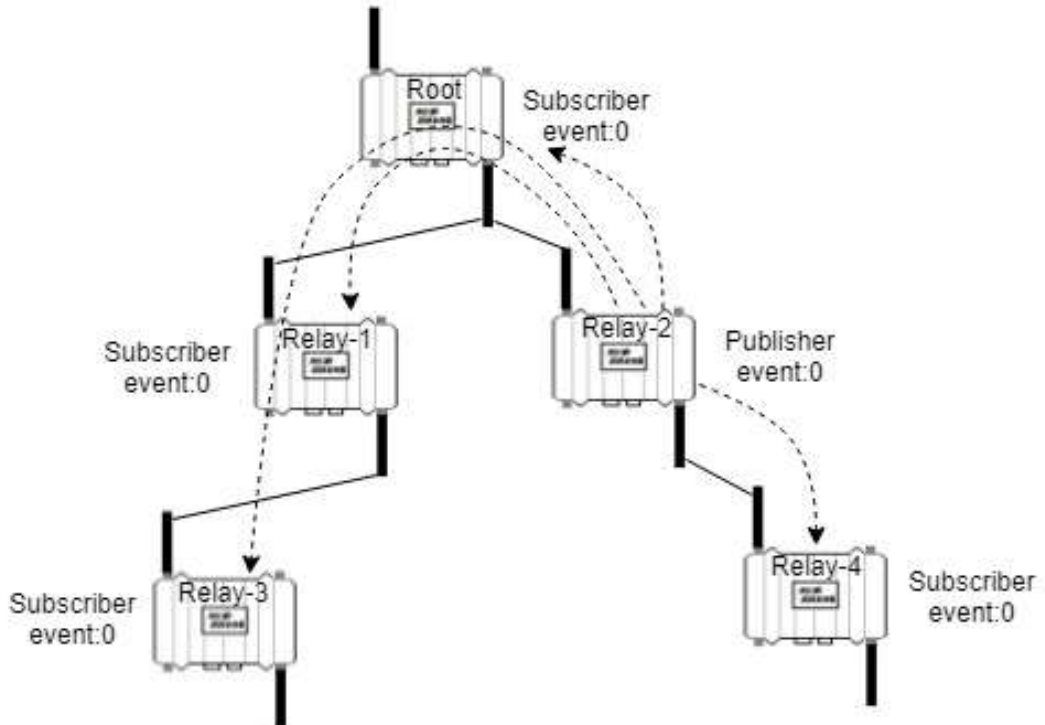
It provides the complete abstraction of the proprietary Mesh Networking algorithm (meshap) from the underlying device drivers. If the underlying device driver changes, the meshap continues to provide services without any impact and no modification is required in the code.

On the top of meshap there is application layer in user space along with its management layer.

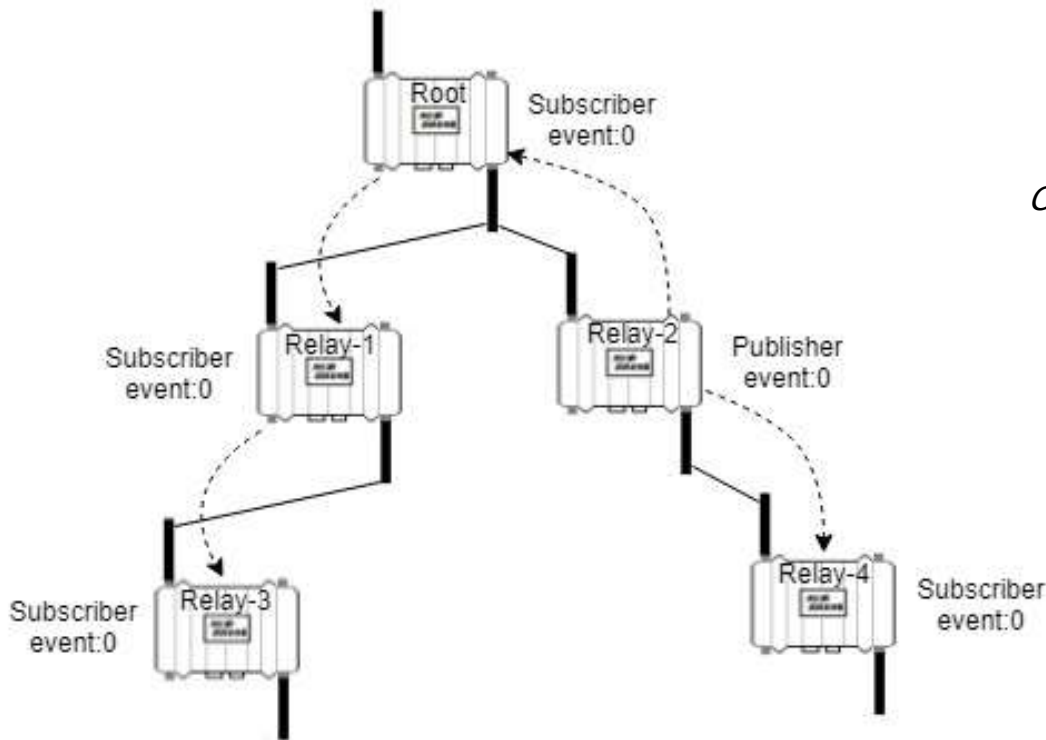
The NMS API uses the application layer management plane for J2EE work flow integration.

On the top of mesh networking the application layer resides in user space along with its management layer. Applications – on the node or in the cloud - can subscribe to different routing strategies or devise their own messaging profiles.

The NMS API uses the application layer management plane for J2EE work flow integration.

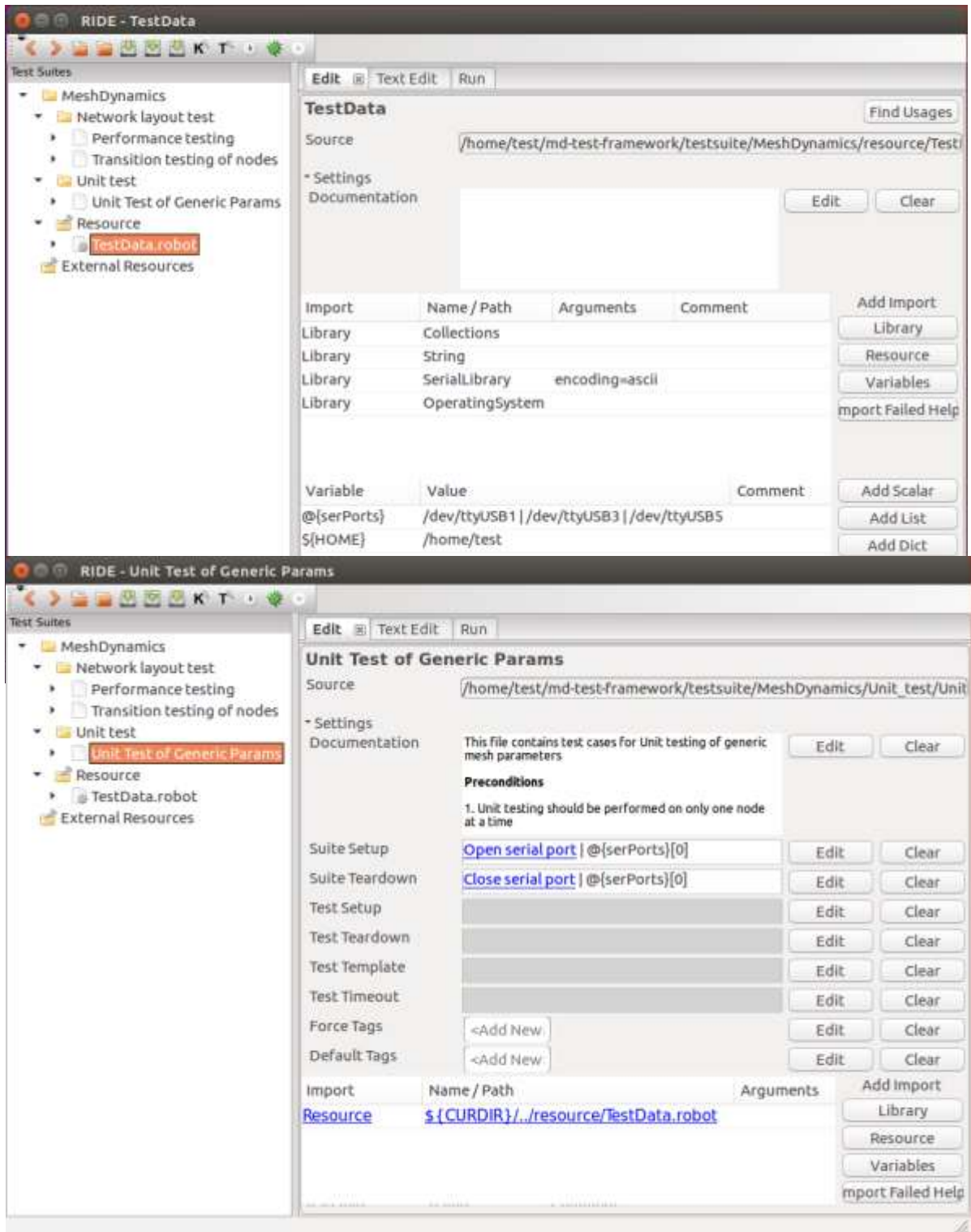


Hub-Spoke Routing

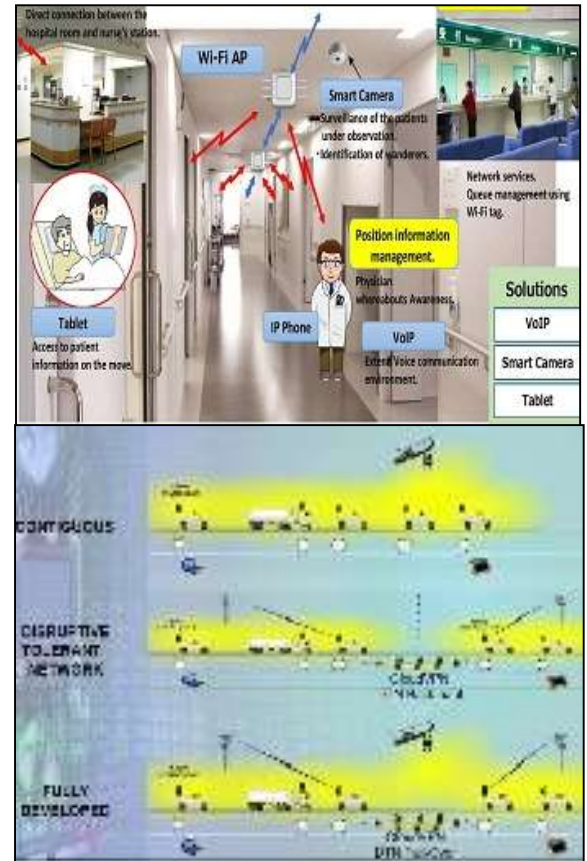
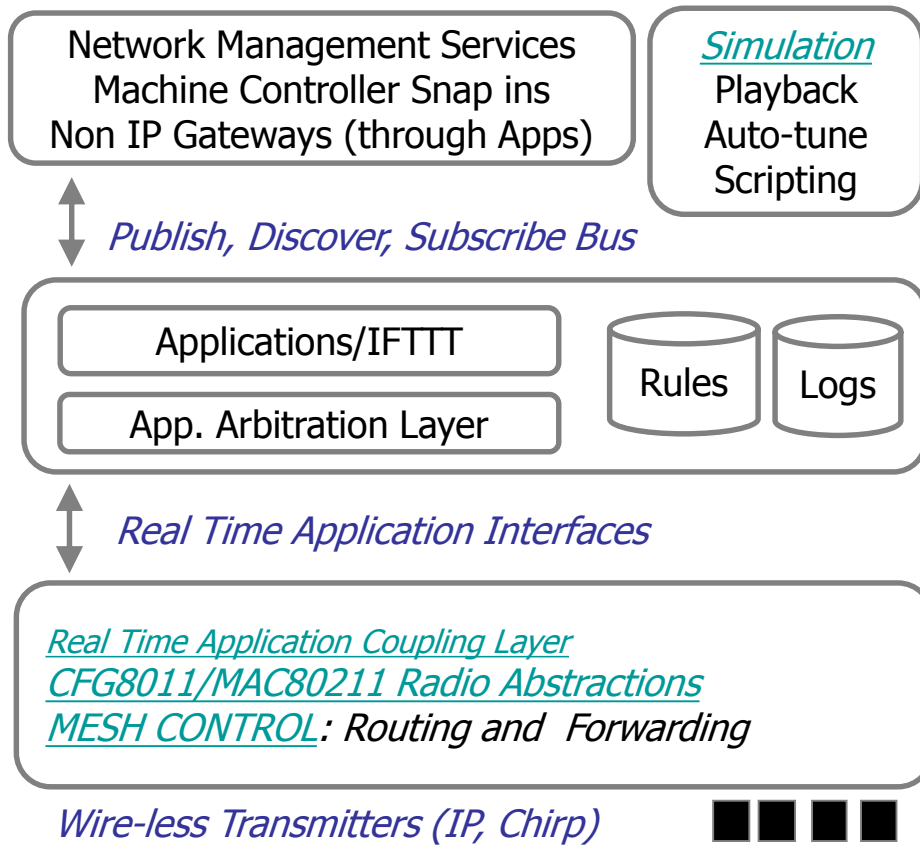


Clone Multi-cast Routing

Python based RIDE Robot test framework used for both unit level and system level tests
 Details under MeshSuite Confluence pages.



An evolutionary wireless network concept has been prototyped for military customers, where the simulation world and real world are in lock step. Machine learning begins at the simulation end, and drives auto tuning algorithms to meet specific difficult use case scenarios. [More](#)



The refined scripts and applications are then uploaded to real mesh nodes to complete the iterative loop. The mesh nodes, through rudimentary publish/discover/subscribe messaging, emulate SDN philosophy for low power devices at the edge.

Nodes resident trusted applications publish real time sensor streams for consumption primarily by other apps in the network. All streams are aggregated at the root nodes and transmitted to big data servers for analysis -- when connected.

Applications customize/tune network behavior, communicating with supervisory apps running on the cloud or a local computer. The distribution of resources (power, bandwidth) is managed collaboratively through the application layer. This keeps the Kernel simple.

Java source code for the NMS and Heart Beat protocol are offered as an illustration of how applications on mesh nodes may publish and listen with their own proprietary heart beat protocols.

[Collaborations Welcomed](#) [Dynamic Tree Topologies](#) [Self Classified Chirps](#) [Smart Simulations](#)

MeshDynamics Licensed Intellectual Property **

J01. Issued 08.07.2017	<u>Terse Message Networks</u>
J02. Issued 06.07.2016	<u>Chirp Networks</u>
J03. Issued 02.09.2016	<u>Chirp Networks</u>
J04. Issued 10.27.2015	<u>Collaborative Logistics Ecosystem: Extensive Framework For..</u>
J05. Issued 06.02.2015	<u>Real Time Packet Transforms To Avoid Re-Transmissions</u>
J06. Issued 04.28.2015	<u>Self Forming VoIP Network</u>
J07. Issued 03.10.2015	<u>Persistent Mesh for Isolated, Mobile and Temporal Networking</u>
J08. Issued 12.30.2014	<u>Chirp Networks</u>
J09. Issued 08.27.2013	<u>Persistent Mesh for Isolated, Mobile and Temporal Networking</u>
J10. Issued 08.20.2013	<u>Real Time Packet Transforms To Avoid Re-Transmissions</u>
J11. Issued 07.02.2013	<u>Self Forming VoIP Network</u>
J12. Issued 06.11.2013	<u>High Performance Mesh Networks- Switch Stack Paradigm</u>
J13. Issued 02.22.2011	<u>Mobility Extensions for Wireless Multiple Radio Mesh</u>
J14. Issued 02.08.2011	<u>High Performance Wireless Networks Distributed Control - Cont.</u>
J15. Issued 09.01.2009	<u>Managing Jitter and Latency in Wireless LANs</u>
J16. Issued 09.02.2008	<u>High Performance Wireless Networks Using Distributed Control</u>
J17. Filed 02.28.2018	<u>Evolutionary Wireless Networks</u>
J18. Filed 02.15.2018	<u>Chirp Networks (Continuation)</u>

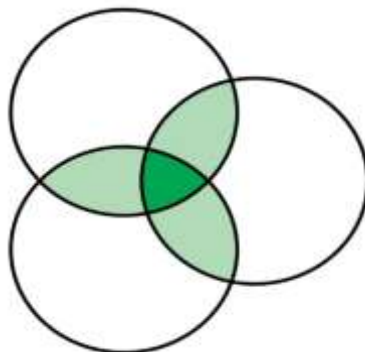
What is covered in these patents and part of Mesh Suite Licenses

Dynamic Tree Topology

- Many Hops, Mobility
- Disruption Tolerance
- Learning Resilience

Abstractions

- Radio Card Agnostic
- Single & Multi-radio
- Application Pub-Sub



Real Time “Fog” Computing

- Real Time Data Streams
- Time Sensitive Networks
- Collaborative Scheduling
- PLC replacement in Node
- Industrial Internet Integration