PhyNet™ Product Suite

DATASHEET

Arch Rock Corporation
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PhyNet brings enterprise-level scalability to wireless sensor networks (WSNs), allowing the formation of large resilient WSNs that can be inter-connected across WAN or LAN links and centrally managed as part of the overall IP infrastructure. With its service oriented architecture (SOA), Internet Protocol (IP)-based networking over standard IEEE802.15.4 radios, and secure, reliable, and responsive low-power mesh networking, PhyNet provides a foundation for rapid development of production deployments and seamless integration with the enterprise.

PhyNet Product Suite

The PhyNet tiered architecture includes:

- **PhyNet Server:** manages collections of WSNs and displays sensor data via a web-based console or standard web services interfaces that lets users setup, manage and gather data from their sensor networks. The PhyNet Server connects remotely to the individual nodes and collective mesh networks through PhyNet routers via LAN or WAN IP networks.
- **PhyNet Router:** forms an adaptive and dynamically routed internetworking backbone between an IETF 6LoWPAN (IPv6 Low-Power Wireless Personal-Area Network)-based WSN and its server-hosted applications; the use of multiple PhyNet Routers within a single WSN eliminates the performance bottlenecks and the single point of failure characteristic of other solutions. PhyNet Routers connect via IEEE 802.15.4 low-power radio to the individual nodes organized in adaptive/ad-hoc wireless mesh networks.
- **Arch Rock IP Nodes:** all Arch Rock nodes perform both sensing and routing leading to unmatched deployment flexibility and reach. The IPsensor Node offers the convenience of integrated sensors to monitor temperature, light, and humidity with the flexibility and autonomy of long-lived battery power. Expansion ports and integrated sensor drivers allow users to easily augment their nodes by choosing from thousands of external switches, sensors and relays to created uniquely tailored wireless networks. The IPserial Node connects to smart digital sensors and serial wired-bus systems to capture, store and analyze previously stranded data.

FEATURES	BENEFITS
End-to-End IP PhyNet extends standard Internet Protocol (IP) technology from the enterprise out to individual sensor nodes, which can communicate natively with any other IP devices on the enterprise network regardless of their connection medium (IEEE 802.15.4 radio, 802.11 Wi-Fi, Ethernet, etc.)	- Eliminates need to co-locate server with wireless sensor network - Easily coordinate IP-device functions across network boundaries - Take advantage of proven IP-based security and management tools - Configure and manage server and router remotely for convenient administration of the wireless sensor network
Scalability - Add multiple PhyNet Routers to a single PAN for additional node egress points - Administer multiple PANs from the PhyNet server	- Improve routing node battery life, scale PAN throughput, and lower latency
Resiliency - Stateless, dynamic IP protocol, routes around failures and rebuilds paths dynamically across multiple sensor nodes and PhyNet routers	- Graceful failover between PhyNet routers ensures continuous uptime
Web Services and Standard Database Interfaces - WSDL, XML, SOAP, REST, PostgreSQL	- Convenient access and integration of embedded data into existing enterprise formats and tools (CSV, HTML) or SQL access
Low Power - Arch Rock energy efficient mesh networking	- Long-lived battery powered sensor nodes allow flexible deployments, reduced maintenance and lower operating costs

APPLICATIONS

	PhyNet Server	PhyNet Router	IPsensor Node	IPserial Node	IPbridge Node
PhyNet Base Configuration Basic Building Blocks for Deployment	1	2	10	2	
Primer Pack/IP Quick out-of-the-box IP-based WSN	1		6		1

DATA CENTER

Better cooling distribution in data centers can eliminate hotspots with the added benefit of preventing equipment faults. Emerging best practices for energy efficiency call for data center managers to increase the level of thermal and power visibility down to the rack and server level. PhyNet product suite provides a wireless solution for rapid and re-deployable sensor networks to evaluate as well as to continuously monitor and tune the data center environment.

COMMERCIAL ENERGY AWARENESS

Energy efficiency improvements begin with enhanced real-time and discrete monitoring down to the desktop to empower employees to become energy aware and accountable. However, building retrofits introduce challenges that Arch Rock Wireless IP-based sensor networks address because they offer a simple way to monitor and measure spaces and things that were once impossible or impractical to instrument.

COMMERCIAL REFRIGERATION / HOSPITAL COLD CHAIN COMPLIANCE

Facilities and compliance managers need measurement data captured and stored on a centralized database with access from a browser, cell phone or other connected device. The PhyNet system eases integration to physically isolated refrigeration units by providing wireless access to sensors using networking standards and standard application data formats. PhyNet features include built-in functions for data persistency and threshold email alerts which can be customized to suite specific requirements.

OUTDOOR DEPLOYMENTS: LANDFILLS, URBAN TERRAIN, AGRICULTURE, EMERGENCY RESPONDERS

No two out-of-doors deployments are alike. Whether operating a WSN in a field of vines, a field of fire, atop a landfill or street-side, the requirements for ruggedized components and enclosures are complex. PhyNet components offer flexible power and antenna configurations with tunable parameters for duty cycle and latency to optimize range, battery life and system responsiveness.

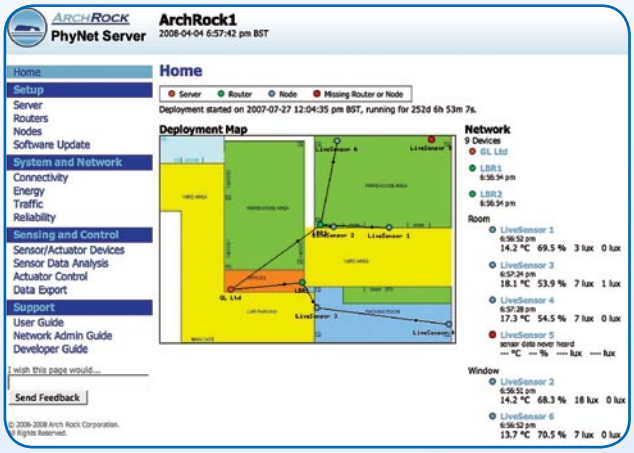
RESIDENTIAL ENERGY EFFICIENCY AND SERVICES

Delivering on the full promise of Utility smart meters and home area networks (HAN) requires a future-proof technology with a lifetime spanning many years.

The longevity and flexibility of the Internet Protocol (IP) standard offers the necessary vendor neutral assurance the marketplace demands.

R&D / HIGHER EDUCATION

Extending IPv6 to every node in the wireless sensor network opens up possibilities for breakthrough solutions to emergent risks and previously unmet needs. Because all Arch Rock sensor nodes perform both sensing and mesh routing, an IP node can be placed anywhere within radio range of any other node to form an ad-hoc, self-forming network.



Sample Commercial Refrigeration Deployment Map

About Arch Rock:

Arch Rock is a pioneer in open-standards-based wireless sensor network technology. The company's products, which gather data from the physical world and integrate it into the enterprise IT infrastructure using IP networking and web services, are used in environmental monitoring, tracking and logistics, industrial automation and control. Arch Rock's founders, while at the University of California-Berkeley and Intel Research, did seminal research and development work on WSNs, creating three generations of wireless sensor nodes, mesh networking protocols, and the leading operating system for sensor networks. For more information, visit www.archrock.com