# AUTOMATED BUILDINGS INTERVIEW APRIL 2007 – Samuel Smith & Ken Sinclair

**Dr. Samuel Smith, President of ASI**

Samuel M. Smith, Ph. D. Is the President and founder of Adept Systems Inc. (ASI). Adept is a technology manufacturing, research and development company focused on networked intelligent automation systems. ASI is based in Eagle Mountain Utah. Adept specializes in standards based automation technology including but not limited to LonTalk and IP. ASI has a product line of smart LonTalk over IP 852 routers, gateways, and nodes. ASI has also conducted DoD sponsored research in survivable automation systems. Dr. Smith received a Ph.D. in Electrical and Computer Engineering from Brigham Young University (BYU) in 1991.

## New LonTalk over IP 852 router eNode™IV

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**Sinclair**: You have just released a new LonTalk® over IP 852 router, the eNode™IV. What does this new product bring to the table that isn't already provided by other similar products on the market?

**Smith:** As you know we have been making LON over IP 852 routers for some time, we have used that experience to push the envelope of performance for price. We believe that one of the ways to grow the LON market in general is to lower the cost of LON network infra-structure without sacrificing performance. The eNode™IV Lon over IP 852 router does just that, and then some. It's not just the least expensive but also the smallest (only uses 35 mm of Din rail) LON over IP 852 router on the market. It is standards compliant and highly interoperable. It's the only one with a WiFi interface option. The goal is to help systems integrators be more competitive, not only in the LON market, but also make LON more competitive when compared to other automation protocols. There is a perception that IP is not a first class citizen with LON. This is not true. The open standard 852 protocol is a fully standard channel for LonTalk. Using 852, you could build an IP 852 only LonTalk network if you wanted to.

**Sinclair**: How does it help with competitiveness?

**Smith:** One of the headaches a system integrator faces is being able to optimise the use of resources for a particular application. In this case network bandwidth and wiring. Using LON over IP for the network backbone has significant advantages. Typically IP infrastructure (wiring, switches) already exists so it's a great place to leverage capability for little cost. Even when IP infrastructure does not exist, the huge IP market keeps costs down. Typically the single biggest cost in using an IP backbone is the LON interface to IP. By driving this cost down we change the value equation.

There are two aspects of systems design that one needs to have flexibility in order to optimise. One of these is granularity, which is, being able to allocate resources in right sized chunks. If the chunks



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are too big, it usually means waste. And typically there is a minimum cost per chunk no matter how small. The other is scalability, which is, being able to grow the capacity of the network conveniently.

**Sinclair**: Can you give an example, to illustrate the point?

**Smith:** Sure, until now the high cost of LON over IP 852 routers has resulted in many LON installations using a two tier approach to a LON backbone. The control points typically use an FTT-10 channel. The first tier of the backbone is a slightly higher speed TP-1250 channel. For this you need an FT-10 to 1250 router for each FT-10 channel. Each 1250 network is then routed on the second tier to an IP/ Ethernet backbone. Recently, quad-port FT-10 to 1250 routers have become available that lower the cost per port somewhat. The problem is that a single 1250 channel can not handle 4 fully loaded FT-10 channels and the Lon over IP 852 routers may not have the capacity to handle 4 fully loaded FT-10 channels. So you have a mismatch. You may have to put fewer nodes on each FT-10 channel or break your LON network up into more channels. If you need to add just one more channel you have a big cost to add another set of routers. The metric one should use here is bit per second per unit cost.

Consider if normalised to standard SNVT sized packets, packets per second per 1 unit cost (pps/ unit cost). So using 600 packets per second for a loaded 1250 channel and retail pricing for a LON/IP 852 router plus four port FT-10 router gets you about 0.48 pps/unit cost.

**In contrast, you can get four eNode™IV's for a little more than the cost of one 4- Port FT-10 to 1250 router plus one LON/IP 852 router from one of our competitors, and all four use less than half the space!**

This means you can put four fully loaded FT-10 channels directly onto a 100 Base-T Ethernet backbone. But a loaded FT-10 channel is 200 pps, or 800 pps for four channels. So the metric including the extra cost is a little better at 0.53 pps/unit cost. If you need a little more capacity you can add it one eNode™IV at a time and no mismatch. This comparison is the best case for the two tier model. If you go to a three or two port switch or need 5 ports your pps/unit cost is much lower than the comparable one tier eNode™IV based design, so you get better granularity and scalability with the eNode™IV.

**Sinclair**: What about installations where back bone bandwidth is not the main problem, but remote connectivity is?

**Smith:** Historically, remote connectivity has been the big application for LON/over IP 852 routing. We support that as a standards compliant 852 LON over IP 852 router. However, as a result of customer requests we have added some unique features to our routers to help in this area. One feature is what we call transparent flood mode. Two of our routers can be configured to bridge FT-10 channels over an IP 852 channel. The FT-10 channels don't even have to know that there is an IP link between them. This really helps in some legacy installations where the master controller's network management does not have the smarts to configure routers. And of course our WiFi 852 version makes it possible to bridge between buildings wirelessly for those application where even IP wiring is not available.



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**Sinclair**: Couldn't I just put another main controller in the remote building. Many of the head end controllers have their own IP based communication protocol that allows for multi-building connectively?

**Smith:** Yes you could, but it may not be the most cost effective solution. Two of our eNode™IV routers will typically cost a lot less than another head end controller. Especially if all you are doing is connecting to a handful of nodes at a remote site. If you have multiple remote sites the economics get even better, as you only need one eNode™IV at the location of the head end controller and only one additional per remote site. Also your integration is simpler; you are just bridging the networks at the LON level, plus you have a transparent, flat, and open network.

**Sinclair**: What about remote connectivity applications where high speed Internet is not available like low bandwidth IP networks that use cell phones, GPRS?

**Smith:** That's a good question; one of the optional features of the 852 protocol is that it tries to simplify the IP 852 management using a configuration server. Unfortunately, the initial formation of an 852 channel can generate a big burst of IP 852 traffic while the devices and configuration server share routing information. This can be a problem for a low bandwidth GRPS based IP channel. Fortunately, we, have several solutions for this. We uniquely support the optional 852 manual mode configuration, which does not require a configuration server. Manual mode allows you to customise your configuration. If all the remote traffic is to the head end and back, then by appropriate manual mode specification of each device's channel list, we can minimise configuration traffic. We also recently added a serial transaction mode that gets rid of bursts in configuration traffic or limits them to a selectable level. Finally, we have an 852 to 852 routing option. When this option is enabled, a eNode™IV can route between two different 852 channels. This enables one to isolate the devices on the low speed GRPS IP channel from say a network management tool and other devices on a high speed Ethernet IP channel. These unique features of the eNode™IV make is a great choice for this application. They also provide what I have been talking about, granularity, and scalability.

**Sinclair**: What if you need to go long distances wirelessly, can the eNode™IV do that?

**Smith:** The eNode™IV uses a standards compliant 802.11b WiFi transceiver with an RP-SMA antenna connector. With WiFi, range is a function of the environment and your antenna/amplifier configuration. While a pair of 2 dbi whip antennas may only get you 100 meters, a pair of 15 dbi directional antennas can go multiple kilometres. The RP-SMA antenna connector allows you to use a wide variety of antenna and amplifier configurations to get whatever range (within reason) that you need. There is so much inexpensive 802.11b WiFi equipment on the market to enable wireless applications. We focus on providing the critical LON to WiFi interface in a compact, relatively inexpensive package, so that system integrators can leverage WiFi for their needs.

**Sinclair**: Seems like a lot for such a little device.

**Smith:** It is, and we say it's about time. In higher volumes the eNode™IV is very economical. We want to expand the LON marketplace by making LON relatively less expensive to install thereby making our customers more competitive not only with respect to other LON integrators but relative to other protocols as well.



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