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Announcer You're listening to the Sun Microsystem's Podcast network. Welcome to another edition of *Innovating@Sun* with your host, Hal Stern. Today's topic: The Sun's Streaming System. And now, here's Hal Stern.

Hal:

Hello and welcome to another edition of Innovating@Sun. I'm your host, Hal Stern, vice president of global systems engineering. And today I have Henk Goosen who is director of engineering in our systems group and Bob Sokol who's a media architect here in global sales and services to talk about the Sun streaming system. And Hank, why don't you tell us what that mouthful means.

Henk:

The Sun streaming system is a new system. It consists of a hardware and software combination that Sun is launching, and its goal is to enable massive scale private unicast video streaming.

Hal:

I think the key word you said there is "private" and "unicast." This is not a broadcast server. This is to basically get whatever content you want to watch out to who ever is on the endpoint.

Henk:

Right. We believe that the future of television is increasingly moving in the direction of personalized content. People are interested in watching what they want, where they want to, and when they want to. And that's what the Sun streaming system is designed to do.

Hal:

So, who's the target market for this? Is it carriers? Is it enterprises? Who's going to be delivering the video?

Henk:

The target market is very much the large operators, the telcos, the cable companies, and the new breed of start-ups that are – that are aiming to bring these personalized television services to consumers.

Hal:

So, dig down underneath the sheet metal a little bit. You talked about the streaming system being built out of hardware and software. What's the platform underneath and where is the creative secret sauce?

Henk:

So, there are six different software applications that make up the software part of this. And these six applications run on three different boxes that are specialized to do all of the functions that are necessary for scalable, unique [inaudible] video delivery. The most unique box and that's the box that we're launching today is called a Sun streaming switch. And this is a 320 gigabits per second 10 cubit Ethernet switch that is optimized to deliver

constant portrayed [?] video with high quality of service. In addition to the Sun streaming switch, the two other boxes that are used in the system, both of these are already launched. One is code name Thumper, which is a highly scalable storage server, and then the other one is the x41, the Galaxy.

Hal:

Okay. So, you have our dense storage server, our dense x64 base server, and a very, very high cross-section bandwidth switch here. What are the software pieces that ride on top of that?

Henk:

So, as I said, there are six applications. Three of these applications are the data path applications. So, there is a – you can think of it as the streaming application that runs on the switch. There's the storage application that runs on Thumper, and then there's an import 3 processor application that runs on Galaxy servers. So, those make up the data part component, and then there are three control plane applications. One application is responsible for session life cycle. One is responsible for content life cycle, and then there is a third application, which is a unified management platform that enables you to operate and manage the whole cluster of applications and hardware as a single unit.

Hal:

So, is it highly available? There's nothing worse than being in the middle of watching some personalized content and the back end crashes, and you have to start over.

Henk:

Right. So, fault tolerance and high availability was very much part of the design from the start. So, all of these applications and hardware boxes on design to operation in a redundant mode. So, the most critical box is the streaming switch, which is capable of supporting well in excess of 100,000 unicast streams, and this was designed to run in pairs. So, that if one switch were to fail, we can switch over to the standby switch in a very short amount of time. And the same goes for – for the x4500 storage servers and all of the other applications.

Hal:

So, you mentioned, I think, one of the software components being the ability to get content on to the streaming system. What types of content? What formats? How do you actually get your bits ready to be streamed out through the switch and the storage system?

Henk:

Today, we support both MPEG 2 and MPEG 4 content. The content is ingested through the import preprocessor. And we can accept either file based content, which is what more traditional video on demand is built on as well as the live import streams. So, we can accept a UDP stream that contains MPEG data coming in, and then the import preprocessor is responsible for conditioning the video for efficient storage and streaming. And while it's doing that, it can also generate additional video tracks, like for example, to be used for trick play like fast forward and rewind streams.

Hal:

So, in terms of secret sauce, you talked about innovation and ability to go drive scale or ability to go drive cost. What do you think the key innovations are here?

Henk:

So, definitely, the key innovation is the Sun streaming switch. I mean, this is really an incredible box. It contains

up to two terabytes of DRAM and it's really difficult to build a very large DRAM system that's both capable of delivering that kind of memory bandwidth, and that also can do the switching at the same time. So, the nonblocking cross-bar switch together with the very high bandwidth memory, I think is the key innovation here.

Bob:

Hal, if I could just add to that, from the content perspective, these guys are tremendously excited by the concept of the stream switch. So, even if they're not looking into the full Sun streaming system for delivering tens of thousands or hundreds of thousands streams to the end-users, they're looking at, "How can they leverage this technology as a disrupter in their business?" If you've got 320 gigabits of non-blocking cross-bar switch, and you look at standard [inaudible] video at uncompressed 270 megabits a second or high def as high as 1-1/2 gig, it's difficult to move that around a normal network. So, if you stick this in the middle, and it has the ability to do some processing or otherwise affect the distribution, you can get tremendous advantages out of this box.

Hal:

Bob, i want you to follow up on that. The fact that it's not just a switch, which is acting as a network virtualization node, moving bits from one points of the network to the other one, but the fact that you can actually do something with those bits as they float through.

Bob:

Yep. And I think there's – you look at it from two different perspectives. You can say, "I can leverage this switch as a way to rationalize the stream so that you've got constant bit rate, and you don't have to worry about artifacts in the video." And the scale of it allows you to act as a buffer, and make sure that the quality of the video is right. On the other side, you can say, "Okay, I'm bringing that in, because it's nonblocking, and I can get as much in as I can get out." And there is – there's Opteron CPUs in there, right? So, there's a way to leverage those CPUs and the processing power and take away some of the IO considerations that you have with standard systems. You can get enormous benefits out of this.

Hal:

Great. So, I want you to follow up a little bit more on the application space. In addition to the fact that the switch in the middle here is a next generation of general purpose platforms, heavily network centric, but the ability to go manipulate content on the fly, you mentioned hundreds of thousands of streams before being able to have an in real time with unique endpoints. What's the secret sauce here? What's the real unique perception I think in terms of scale or in terms of cost? Are we driving the market here?

Henk:

Well, I think on the software side, it is a very interesting architecture. It's a distributed system, and it's a distributed object system that contains Sun developed IP there. It's extremely difficult to operate reliably and with high performance at these kind of scales. I mean, so, for example, one way of looking at this on stream system is just a very big VCR. So I mean if you look at it that way, it's conceptually very simple. But the thing that makes it special is being able to guarantee that it's going to operate with hundreds of thousands of streams, all operating concurrently, and with very low latency, and you had to do some pretty interesting software things to make that possible and to make that robust in face of failures.

Hal:

Bob, anything else you want to add from a market perspective in terms of how we're trying to tip the industry perspective?

Bob:

So, I think you can – from the service providers' perspective, they have a unique way of rolling out content without racks and racks of equipment. So, this is an order of magnitude of the smaller systems that exist today to get the number of streams that you need. With existing boxes, you really need to scale to multiple, multiple racks, and you wind up with rows of racks. So, there is tremendous consolidation from their perspective plus you wind up with unicast streams rather than multicast. So, when you look at things like advertising, directed advertising and revenue, you can do tremendous targeted advertising, because these guys obviously know where the endpoint is. They know your neighborhood. They can do some aggregation around what your likes and dislikes are, based on aggregated values. Of course, there's privacy concerns there. When you target the ads and you know you're going to get a better response rate, you can increase the ad revenues that you get. So, I think it moves the market in terms of both scale and consolidation and how they go sell that content. And the content providers are looking to leverage their content wherever they can. So, a true three screen experience in terms of on demand content, when you want it, how you want it, and ad supported [inaudible] still stays in place.

Hal:

Great. And Hank, anything else from the engineering side that you want to add?

Henk:

Well, I think what I'd like to add is just to follow up with what Bob said that up to now, the technology really has not existed to do personalized television or personalized video on any kind of scale. And I think that what we're hoping to do is to catalyze instead of new services and applications out there that is going to be very valuable to consumers and we hope that this is going to energize a much more interesting television marketplace out there.

Hal:

Great. So, what's next? What's sort of next on your radar? What's next in terms of your engineering priorities?

Henk:

Well, clearly, the first thing that we need to do is to make sure that our first customer deployments go exceedingly well. We have a number of feature enhancements that are scheduled to come out over the next few months. We're interested in exploiting the incredible roadmap that the systems group is putting out there, as there are a lot of very innovative hardware platforms coming out. I think it's important to realize that the Sun streaming system is the software platform, and it wants to leverage all of these new hardware platforms that are coming out. They're very interesting boxes and network equipment coming out that we want to leverage.

Hal:

Great. I want to thank both of you for being guests today and talking about the Sun streaming system. Again, you've been listening to Henk Goosen, director of engineering in the systems group, responsible for the streaming system product and Bob Sokol, media architect in global sales and services. This has been an Innovating@Sun Podcast. I'm your host, Hal Stern.

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