

SC15 Demonstration Plan

November 2, 2015

NTT Network Innovation Laboratories



Outline of the demonstration

- Objectives

1. Demonstrate a real-time parallel 4K video processing over geographically distributed computer resources
 - Two uncompressed 4K video contents sourced from different places in Japan will be processed pipelining the server farms both in Japan and the US in real-time with NTT's distributed parallel processing method.
 - The fragmented 4K video contents synthesized from the original 4K sources will be sent to the SC15 venue over different network paths and recomposed as the completed uncompressed 4K video content, by synchronizing the streams received from computers located in Japan and the US.
2. Demonstrate a 4K uncompressed video transmission over SDN
 - Uncompressed 4K video signal will be transmitted in real-time from Brazil to the SC15 venue, by dividing it into four sub-streams. The four streams will be recomposed to produce the original 4K video at the venue by synchronizing the four streams having different transmission latencies.
 - The network for this demonstration will consist of four SDN switches (Lagopus) located in the US and the R&E networks including Internet2 , AmLight and RNP.
 - The effectiveness of this virtual overlay network will be proved through this trial in addition to the evaluation of the path switching times.

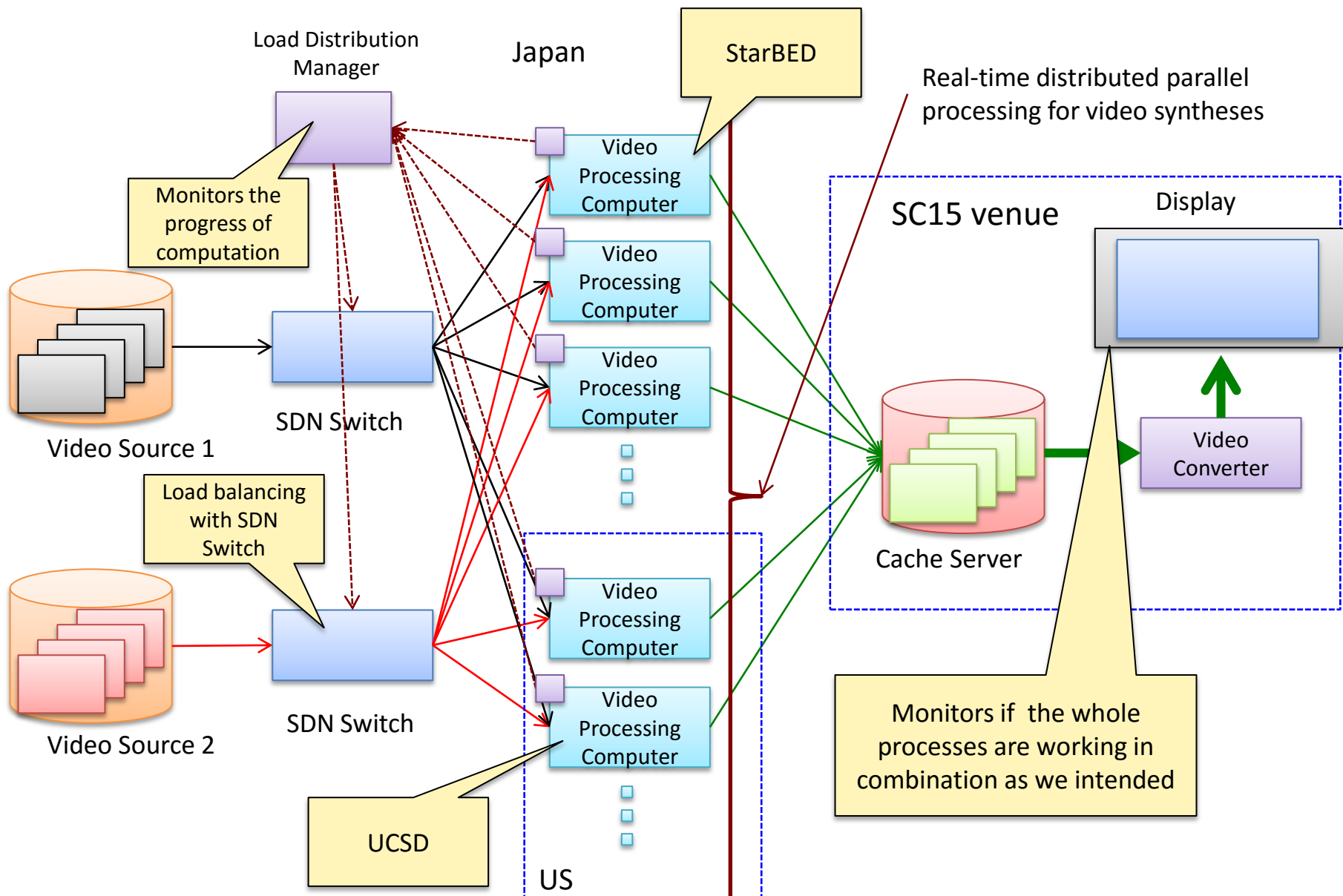
Network resources for the demonstration

- Network infrastructure
 1. Network infrastructure for the SC15 venue (by Matt Zekauskas)
 - Internet2 will have four 100G connections into SCinet; two in Texas for general use, that are attached to their Advanced Layer 2 Service, and will have Advanced Layer 3 Service connectivity from two of their routers; one from the New York MAN LAN exchange point, and one from their Los Angeles AL2S node principally to pick up a new 100G that is going to Singapore.
 - At 10-30G, we should be able to run a demonstration without having to worry about timesharing with other experiments in to SC.
 - There are plans for a TransPac 100G into Pacific Wave Seattle, and a 100G circuit from Seattle to SCinet.
 2. Network infrastructure for connecting Japan and Brazil
 - (Demonstration 1) In addition to GEMnet2, SINET and JGN-X will be used for the trans-Pacific connections. The new TransPac 100G link will be used as well.
 - (Demonstration 2) AmLight and RNP will be used to connect Brazil as we did for the demonstration at the Internet2 Technology Exchange in October, 2015.

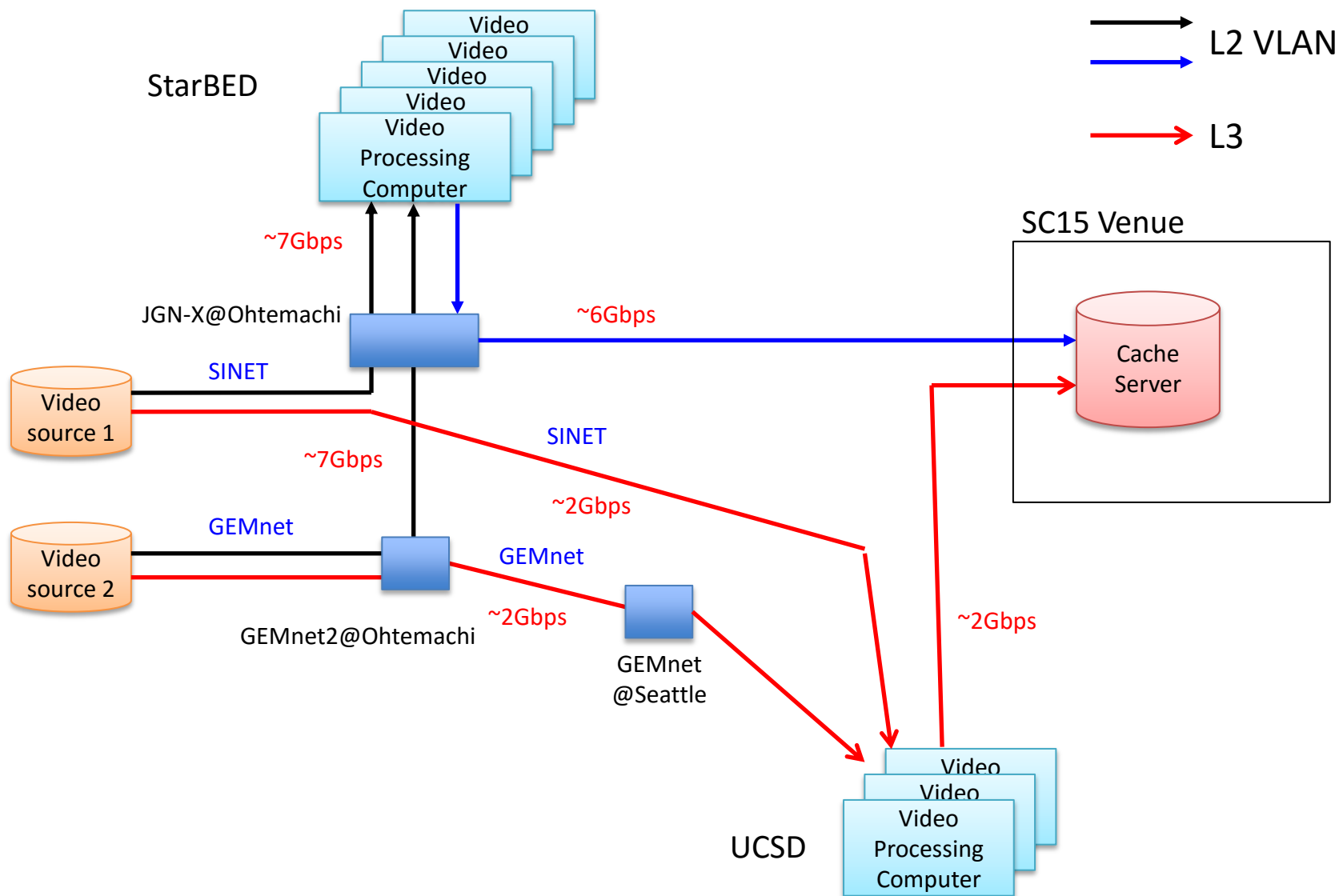
Sharing resources for the demonstration

- Issues need to be clarified
 1. Connections between Japan and the US
 - The bottleneck might exist in the trans-Pacific part, because at least one Japanese research group plans to utilize the link connecting and the SC15 venue Japan to the limit .
 - At this moment we are not sure if their plan conflicts with ours and will investigate the necessity of sharing the bandwidth in time domain.
 2. Connections between Brazil and the US
 - At the Technology Exchange demonstration we needed to ask RNP to divert all four sub-streams to AmLight link to avoid the congestion. We need to confirm that this solution can be applied for the coming demonstration.
 3. Connections inside the US
 - At the Technology Exchange demonstration we observed that small amount of packet losses occurred when we transmitted the 6.8Gbps test traffic (equivalent to the traffic of four uncompressed 4K sub-streams) from the West Coast (Seattle).
 - We think this problem can be avoided when we route two sub-streams from West Coast and other two from East Coast, but it's preferable to do more investigation.

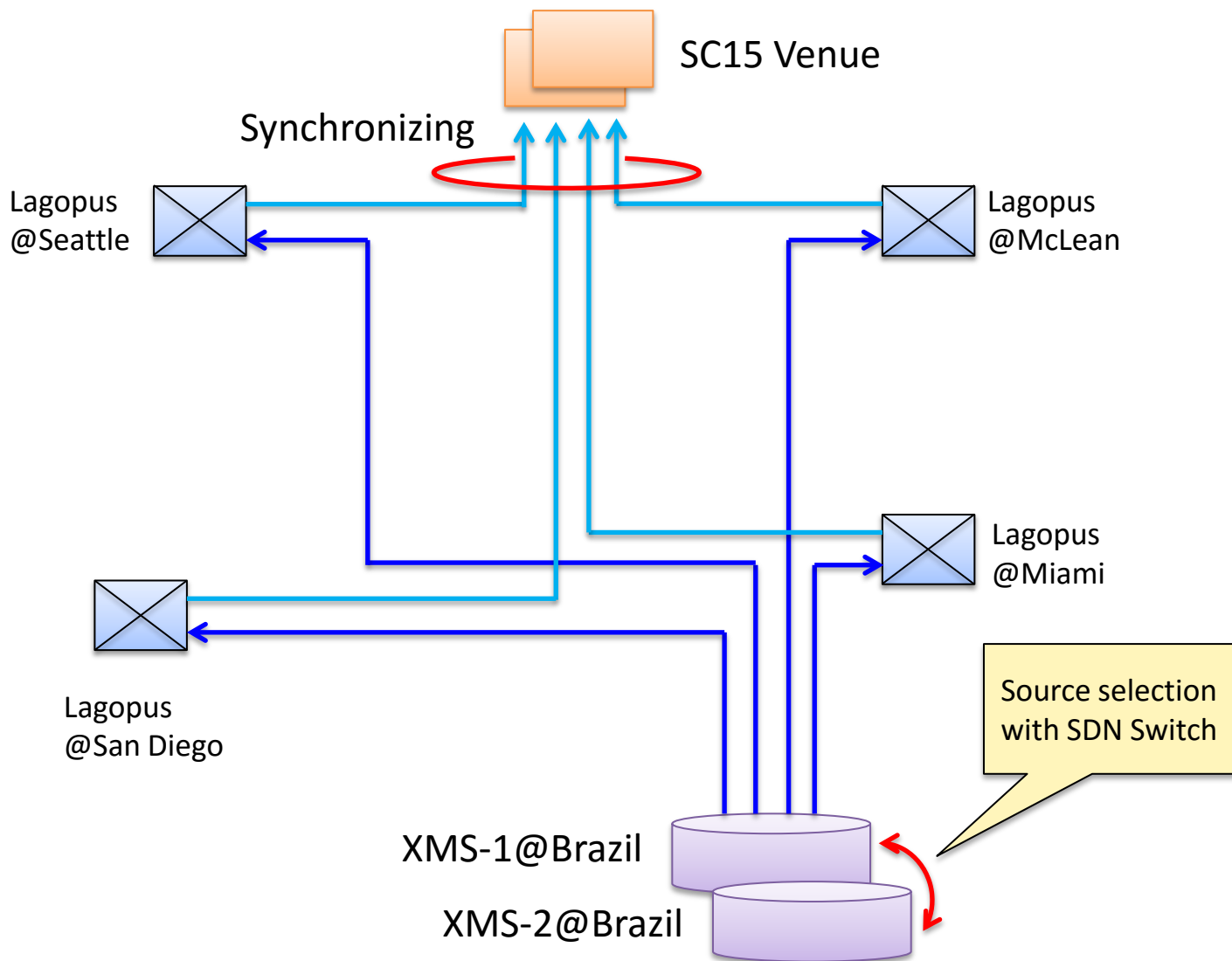
Outline of Demonstration 1



Data flow of Demonstration 1



Outline of Demonstration 2



Main L3 Global IP Connections

