# Internet2 IPv6 Line Speed Record between CERN and Chicago

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# Summary

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- Network Configuration
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- Sustained Throughput

# Internet2 LSR Contest

http://lsr.internet2.edu/

"A minimum of 100 megabytes must be transferred a minimum terrestrial distance of 100 kilometers with a minimum of two router hops in each direction between the source node and the destination node across one or more operational and production-oriented high-performance research and education networks"

"Unit of measurement is bit-meters/second"

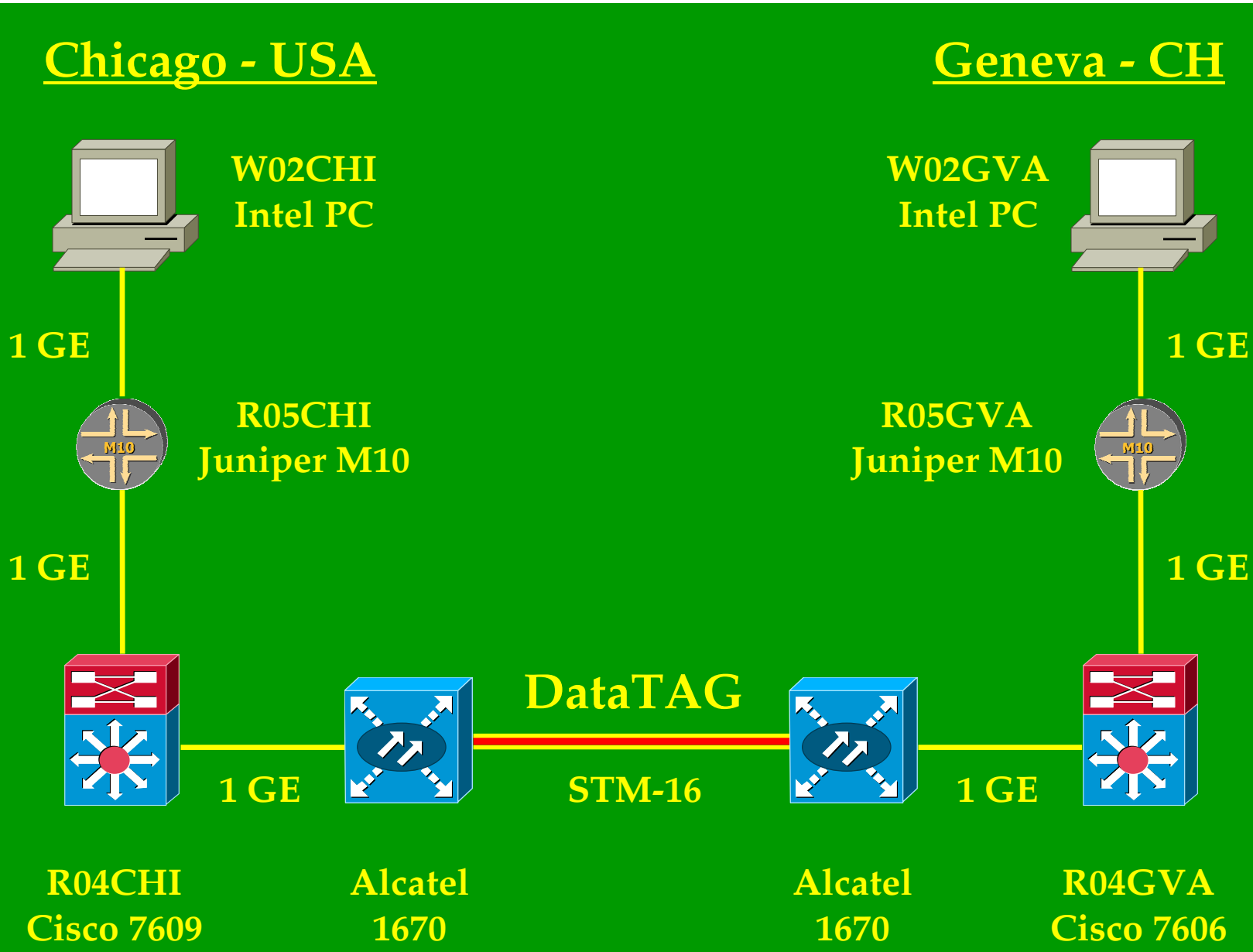
# Former LSR

- TCP/IPv6 Single Stream
- By ARNES, DANTE & RedIRIS
- Established on 9 October 2002
- 14,800 Kilometers of Network
- 348 Mbits/second - 16.26 seconds
- Data transferred: 675 Megabytes
- 5,154 Terabit-meters/second

# Current LSR

- TCP/IPv6 Single Stream
- By CALTECH & CERN
- Established on 2 May 2003
- 7,067 Kilometers of Network
- 983 Mbits/second - 3600 seconds
- Data transferred: 412 Gigabytes
- 6,947 Terabit-meters/second

- See "http://cern.ch/ipv6-lsr/"


Chicago - USA
Geneva - CH
W02CHI
Intel PC
W02GVA
Intel PC
1 GE
1 GE
R05CHI
Juniper M10
R05GVA
Juniper M10
M10
M10
1 GE
1 GE
DataTAG
1 GE
STM-16
1 GE
R04CHI
Cisco 7609
Alcatel
1670
Alcatel
1670
R04GVA
Cisco 7606





# The DataTAG Project

## esearch and Technological Development for a TransAtlantic GRID

*The goal is to create a large-scale intercontinental testbed for data-intensive Grids with a focus on "**Network Research**" and "**Grid Interoperability**"*

**DataTAG-Funded Partners**

PPARC (UK), INRIA (FR), UoA (NL), INFN (IT) & CERN (CH)

**Test-bed**

Transatlantic STM-16 (T-systems)

between Geneva (CERN) and Chicago (StarLight)

See "http://www.datatag.org/"

# Workstation Hardware

## Linux PCs at CERN & Chicago

- Syskonnect Gigabit Ethernet Interface
- CPU Type: Intel(R) XEON(TM)
- Two CPUs each at 2.20GHz
- Standard Red Hat Linux 7.3
- Standard Linux Kernel 2.4.20

# TCP Parameter Tuning

- By Using an MTU [Maximum Transmit Unit] of 9000 bytes [Jumbo-Frames] on the Interface, one Obtains 983 Mbps [MTU 1500 = 919 Mbps]
- By Performing a Fine Tuning of the TCP Window Size, one Obtains the Best Performance with a Window Size of 11MB [MTU 1500 = 69.7 MB]

# Sustained Throughput

This LSR shows that high sustained throughput is in principle possible with TCP over long distance!

This is new with respect to former results, where the throughput could be sustained only for 40-60 seconds, before some TCP feedback mechanism kicked in and ruined the performance!


# Acknowledgements
## - organisations -



*Thank you*