

VFER: Bulk Transport Tool

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VFER summary

- easy to use on today's advanced networks (download, make, install)
- portable (no kernel mods)
- out-of-the-box performance
- tolerate minor non-congestive packet loss
- both static file transfer and interactive applications
- runs over UDP
- TCP-friendly

Bulk Transfers

- The killer application for high-performance networks so far
 - What else do we need fat pipes for?
- Several flavors:
 - straightforward huge file transfer
 - interactive high-throughput applications (e.g., ImmSeg)
 - instrument data transfer (e.g., e-VLBI)
- Poor performance ($\sim 3\text{Mb/s}$ performance where we should have $\sim 60\text{--}100\text{Mb/s}$)
- #1 reason of poor performance: transport protocols

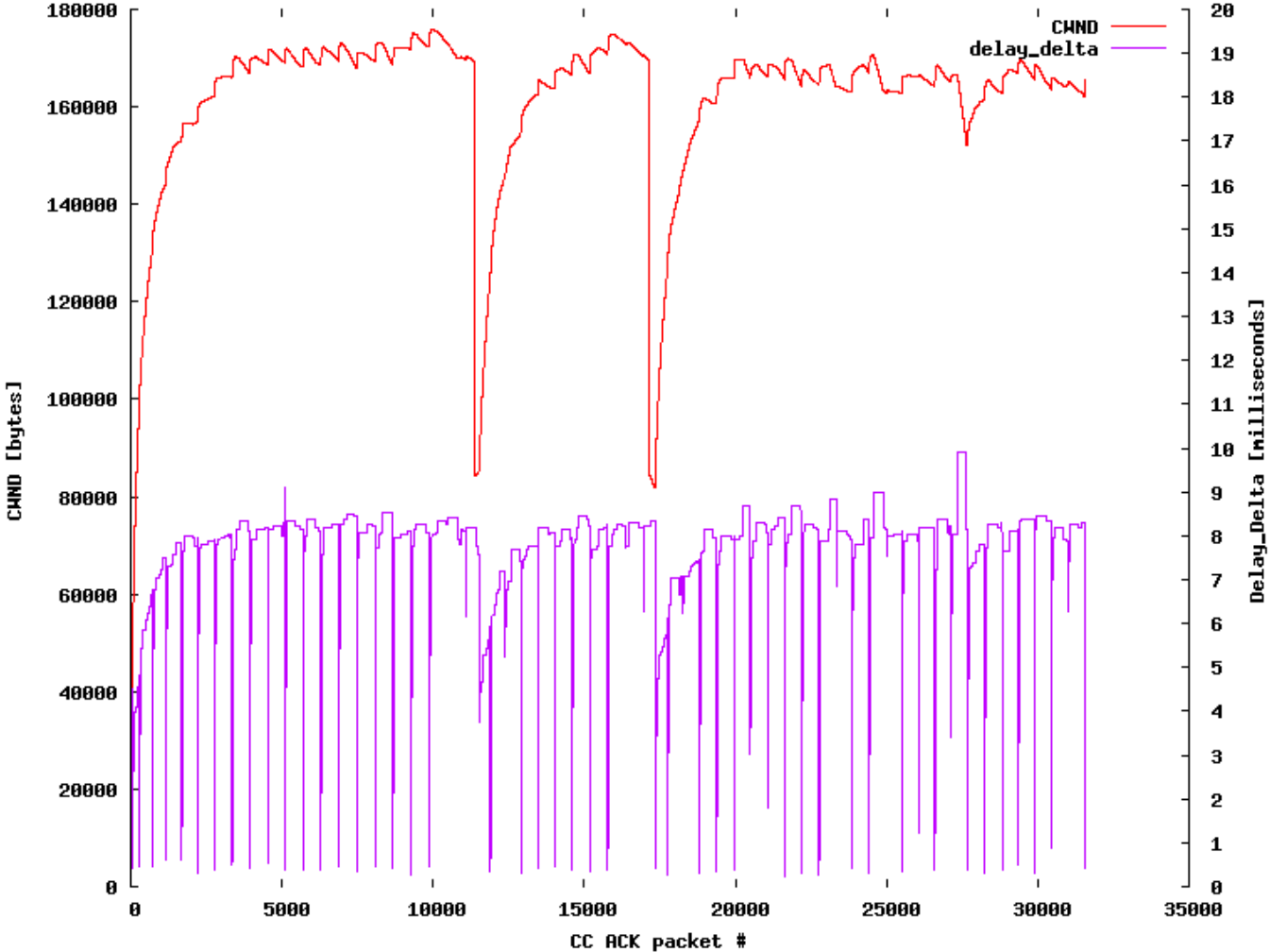
VFER: current status

- VFER is in α -testing
- Working, but not polished, delay-based congestion control
- SSH-based security
- version 0.98

VFER: delay-based congestion control

- Increase window when delay is small
- Decrease when delay is large
- Measure one-way packet delay and
 - $\text{base} = \min(\text{all delays})$
 - $\text{delay} = \min(\text{recent delays})$
 - $\text{delay_delta} = \text{delay} - \text{base}$
 - $\text{off} = \text{delay_delta} - \text{TARGET}$
 - $\text{cwnd} \pm = \text{GAIN} * \text{off}$
 - gain currently calibrated so that the max cwnd increase is 16 packets/RTT
 - on loss: $\text{cwnd} / = 2$
- Avoids inducing loss
- Avoids inducing excessive delays

Sample WAN transfer with VFER



PLPMTUD for VFER

- Implement Packetization Layer Path MTU Discovery (PLPMTUD) for VFER
- New MTU discovery algorithm – doesn't depend on ICMP
- Status: done and integrated.
- By Andrew Lake (as a GSoC project)

Security

- Min goal: transfer of SSH credentials to VFER
- Max goal: self-contained key exchange
- Status: min goal done, part of design done for max goal
- By Nikolaus Rath (as a GSoC project)

VFER: Participants

- Ivan Beschastnikh (lead developer)
- Andrew Lake (PLPMTUD)
- Nikolaus Rath (security)
- Stanislav Shalunov

VFER: Project history

- Bulk transport WG discusses, works on design (<http://transport.internet2.edu/transport-design-space.pdf>), API (<http://transport.internet2.edu/transport-api-06.pdf>)
 - October 2004–May 2005
- Google starts Summer of Code 2005 program, Internet2 participates – June 2005
 - Several transport-related projects, different directions
 - Most promising: Ivan's code (different project name then)
- Ivan works on VFER as an Internet2 intern – September 2005–May 2006
 - VFER in α -testing, loss-based congestion control
- Google starts Summer of Code 2006 – May 2006
 - Andrew, Abhijeet, and Nikolaus start as participants
 - Ivan a mentor

- Download: <http://vfer.internet2.edu/>
- Questions, documentation problems, bug reports, etc.:
vfer-users@lists.sourceforge.net (also subscribe)
- Give it a spin and let us know!

Questions?