



UNIVERSITY OF AMSTERDAM

 System and Network Engineering

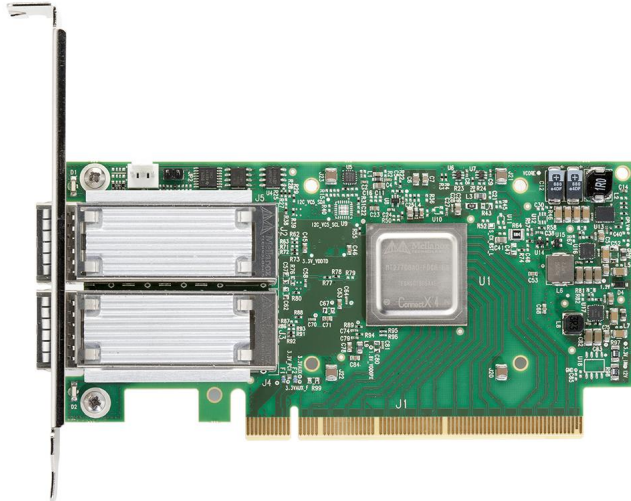
Building User Friendly Data Transfers Nodes

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3 December 2018

Funded by SURFnet

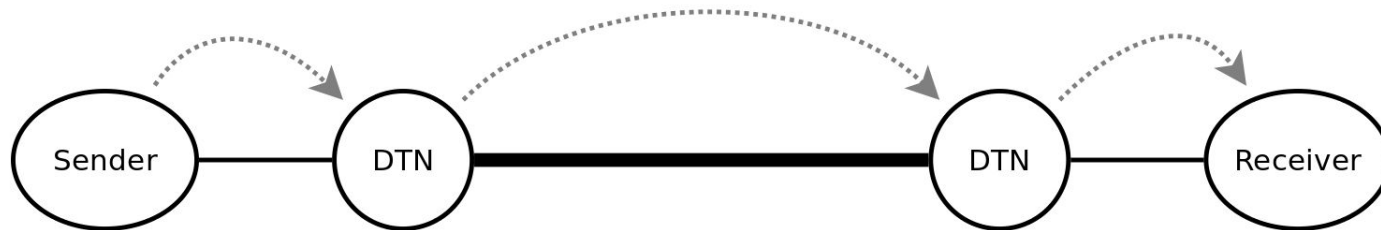
Data Transfer Node (DTN)

- A specialized system to conduct high performance data transfers
- Can be used in a variety of work flows
- Many possible configurations depending on the workflow



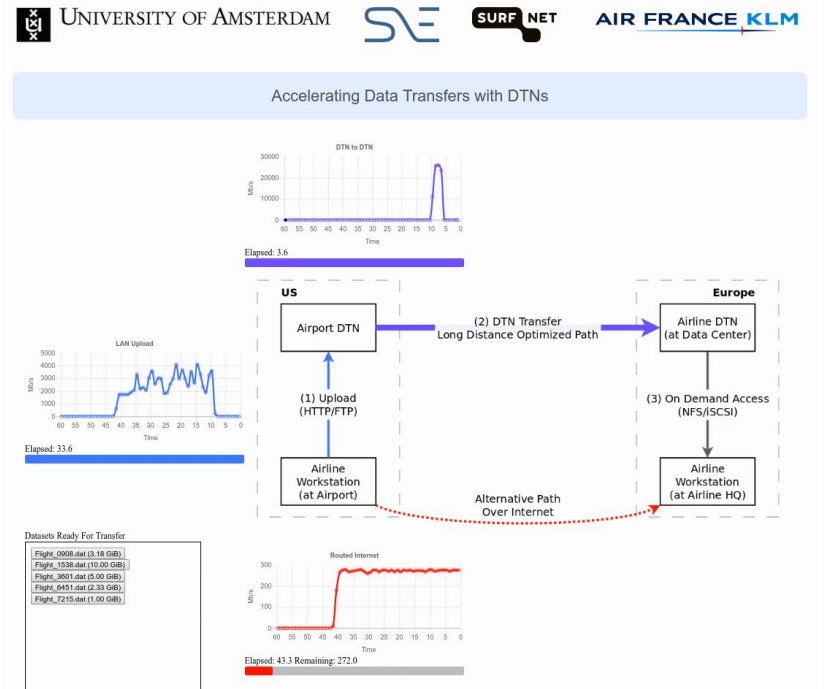
User to User Transfer

- Sender and receiver are a long distance apart
- Each has access to a nearby DTN
- DTNs have a high speed link between them
- User driven workflow



DTN Demonstration

- Workstations not optimized for long distance transfers can benefit by using an optimized path with DTNs
- Scenario shows a file transfer from a workstation in the US to a workstation in Europe
- Compares a file transfer over an optimized path with DTNs versus path over the internet
- Indirect path utilizing DTNs achieves substantially better performance than a file transfer directly between the workstations
- Just one example of how DTNs can act as an interface to a path optimized for a specific data transfer



Motivation

- Ideally users could send directly to each other utilizing all available bandwidth
 - Administrative barriers
 - Requires common protocol
- Path may supply greater bandwidth
- High speed link can be faster even with multiple file copy steps
- Goal: Provide a means to use high speed links while minimizing changes for researchers

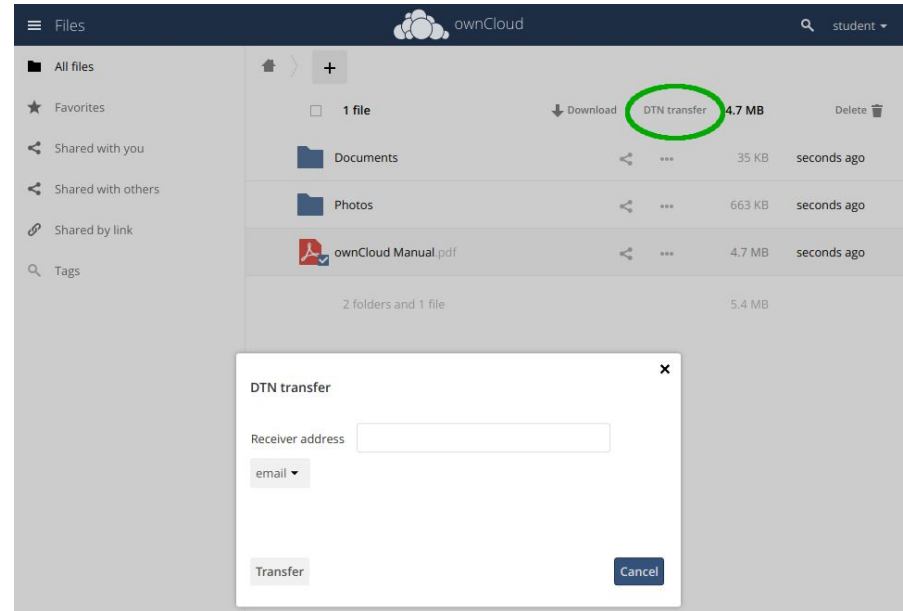
FileSender

- Sender uploads to the site, recipient downloads from the site
- Uses HTML5 for transfers
 - Multiple TCP streams
 - Supports large files
- Only one user needs an account
 - Only requires email address of other user

The screenshot shows the FileSender web interface. At the top, there is a navigation bar with 'Upload', 'Guests', and 'My Transfers' tabs, and 'Help', 'About', and 'Log-off' links. The main area features a large dashed box for file uploads with the text 'drag & drop your files here'. Below this are 'Clear all' and 'Select files' buttons. The configuration section includes a 'From' field with the value 'student@localhost.localdomain', a 'To' field with a placeholder 'Enter recipient email(s)', and optional fields for 'Subject' and 'Message'. A 'File Encryption (beta)' checkbox is present. On the right, there is an 'Expiry date' field set to '13/12/2018' and a list of notification checkboxes: 'Notify me when expired' (checked), 'Notify me when upload is done' (unchecked), 'Notify me upon downloads' (checked), 'Send me a report when expired' (checked), 'Include me as a recipient' (unchecked), and 'Get a link instead of sending to recipients' (unchecked). An 'Advanced settings' link is also visible. At the bottom, there is a large 'Send' button with an upload icon.

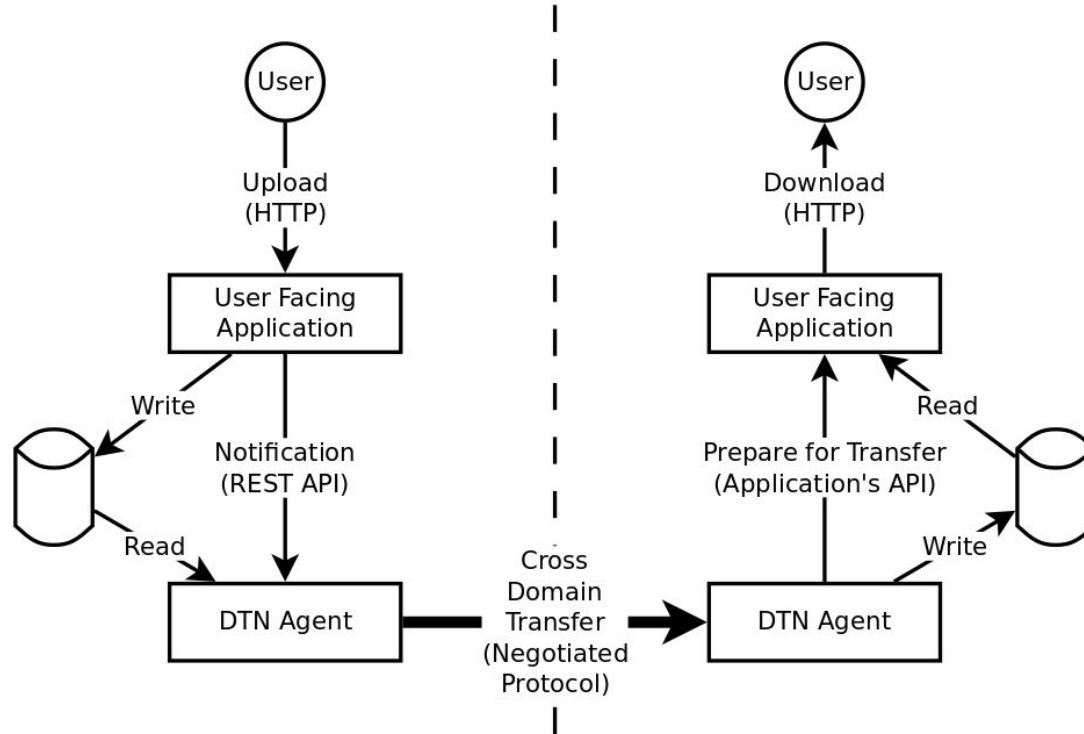
ownCloud

- Data lives within the system
- Support for sharing between users
- Support for federation
- Change to user interface required to support DTN transfers



ownCloud changes done by Antoon Prins of SURFsara

DTN Assisted Transfer



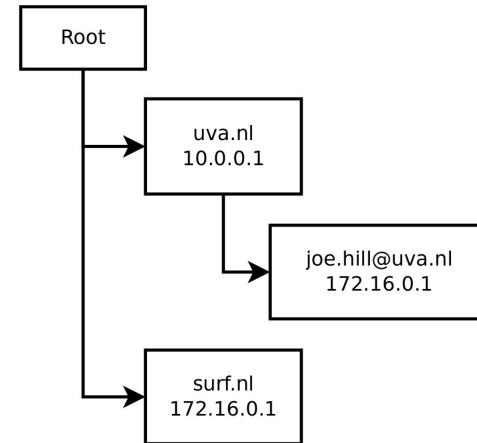
DTN Agent

- Provides the user facing application with an interface to a high speed link
- Applications do not need to be the same across domains
- Agent has a module for each application that it supports
- Application's existing API is reused where possible
- Agent handles discovery of the peer DTN

DTN Discovery

- What do we want the sender to have to know about the recipient
- DNS service records can be used similarly to MX records
- Users may want to set a different DTN for themselves
- Alternatively a DTN registry could be setup using LDAP
 - A trusted root would need to be established

```
_dtn._tcp.uva.nl IN SRV 0 0 3001 dtn.uva.nl.  
_dtn._tcp.surf.nl IN SRV 0 0 3001 dtn.surf.nl.
```



Data Transfer Protocols

- Negotiated by agents
- GridFTP, FDT, mdtmFTP, SCP
- Security typically relies on a known user
- Each transfer application implemented as a module

Future Work

- Use AutoGOLE to dynamically setup high speed links
- Agent to Agent Protocol not finalized, many security questions remain
- Add support for one time tokens to data transfer applications
- Protocol negotiation based on dataset
- Determine a protocol of last resort
- Transfer status and error handling

Questions?