Globus Endpoint Administration

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NCAR – September 5, 2018

globus

Get your server: **bit.ly/ec2ip**

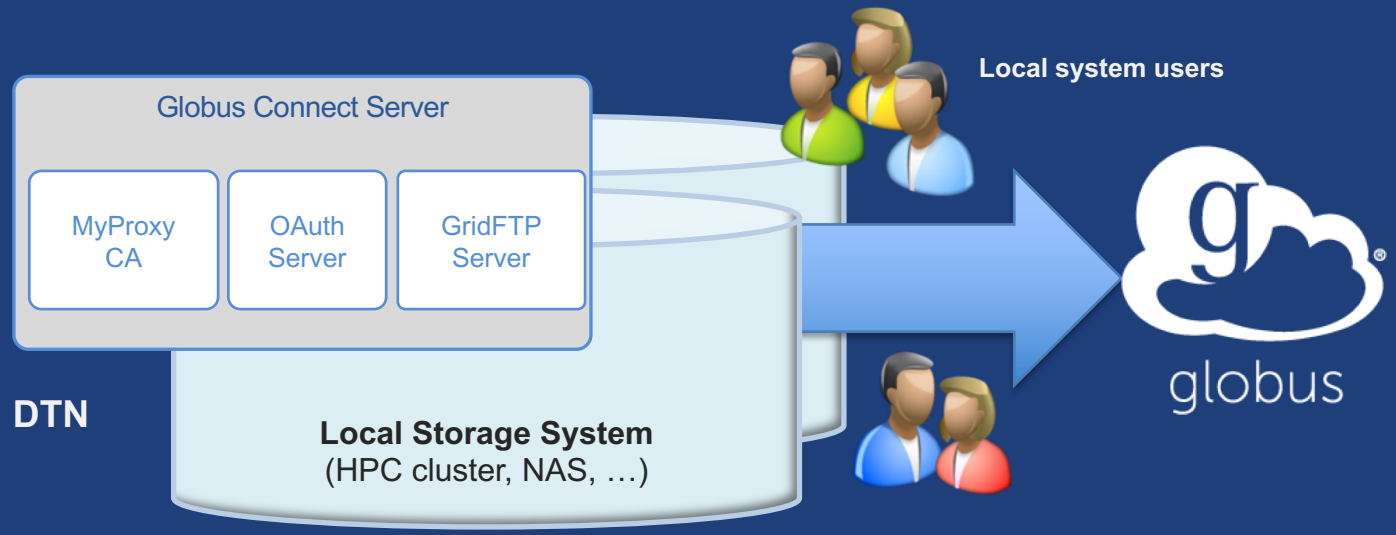
1. Select an empty row in the spreadsheet
2. Enter your name and email address
3. Make a note of the IP address displayed

Slides and useful links:

globusworld.org/**tutorials**

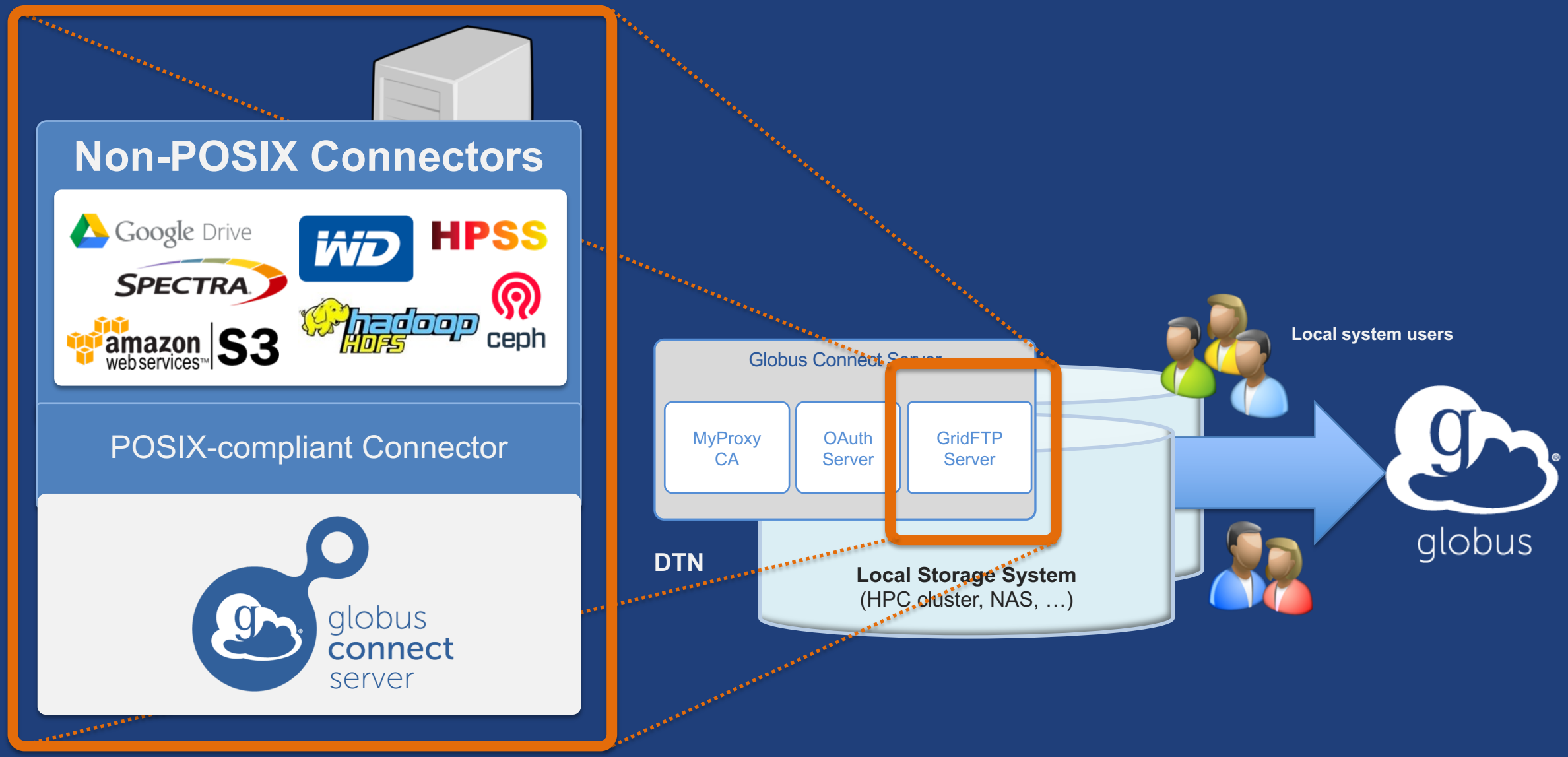
Globus Connect Server

- **Makes your storage accessible via Globus**
- **Multi-user server, installed and managed by sysadmin**
- **Default access for all local accounts**
- **Native packaging Linux: DEB, RPM**



docs.globus.org/globus-connect-server-installation-guide/

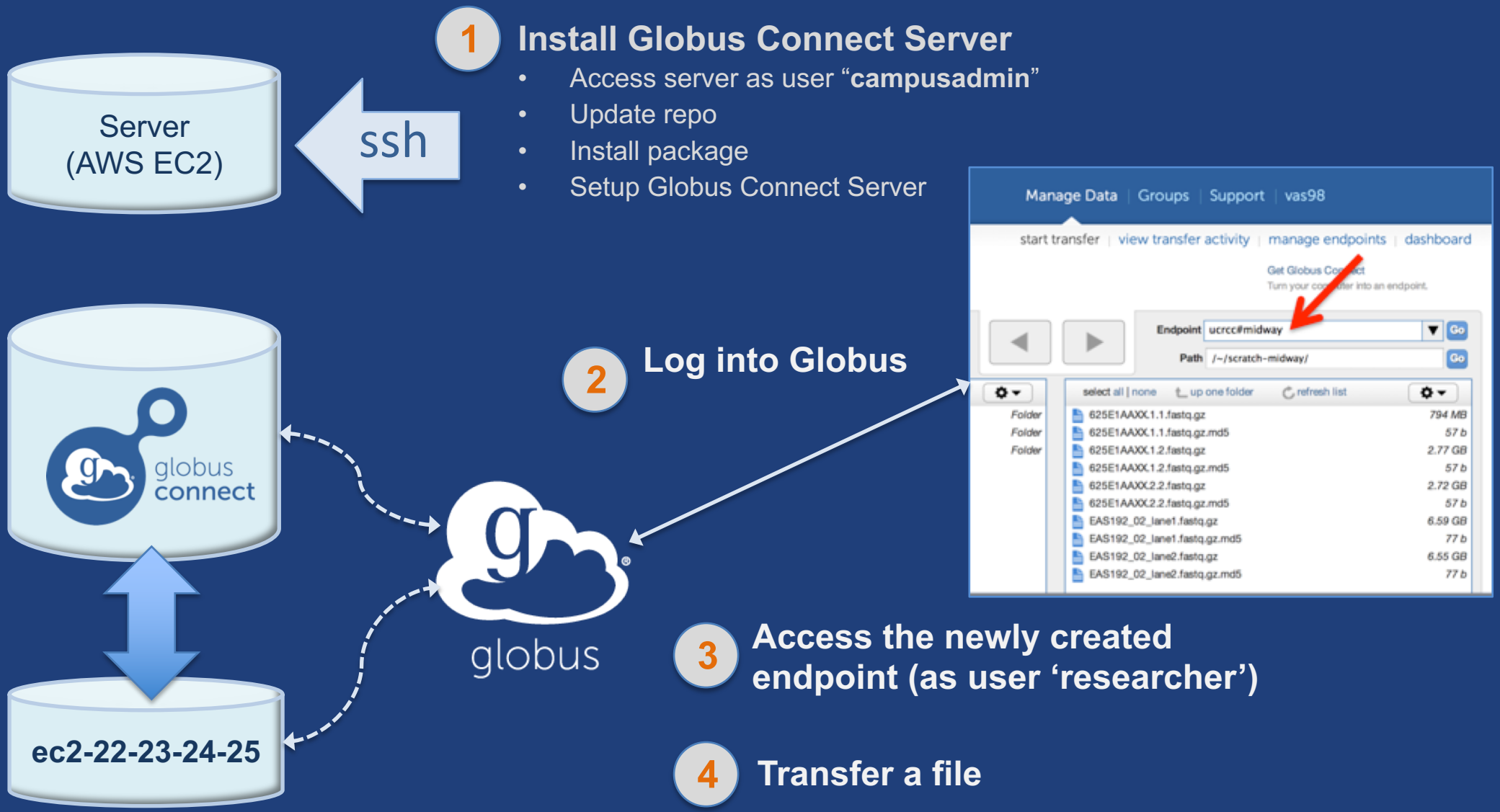
Globus Connect Server



Creating a Globus endpoint on your server

- **In this example, Server = Amazon EC2 instance**
- **Installation and configuration of Globus Connect Server requires a Globus ID**
- **Go to `globusid.org`**
- **Click “`create a Globus ID`”**
  - Optional: associate it with your Globus account

What we are going to do:



1 Install Globus Connect Server

- Access server as user "**campusadmin**"
- Update repo
- Install package
- Setup Globus Connect Server

2 Log into Globus

3 Access the newly created endpoint (as user 'researcher')

4 Transfer a file

Access your server

- **Get the IP address for your EC2 server (bit.ly/ec2ip)**
- **Log in as user ‘campusadmin’**

```
ssh campusadmin@<EC2_instance_IP_address>
```

- **Please** `sudo su` **before continuing**
  - User ‘campusadmin’ has passwordless sudo privileges

Install Globus Connect Server

```
$ sudo su
$ curl -LOs
http://downloads.globus.org/toolkit/globus-connect-
server/globus-connect-server-repo_latest_all.deb
$ dpkg -i globus-connect-server-repo_latest_all.deb
$ apt-get update
$ apt-get -y install globus-connect-server
$ globus-connect-server-setup
```

Use your Globus ID username and password when prompted

You have a working Globus endpoint!

Access the Globus endpoint

- **Go to Manage Data → Transfer Files**
- **Access the endpoint you just created**
  - Search for your EC2 host name in the Endpoint field
  - Log in as “researcher”; you will see the user’s home directory
- **Transfer files to/from a test endpoint (e.g. ESnet read-only) and your EC2 endpoint**

Globus accounts and endpoint access

- **Globus account: Primary identity (+ Linked Identities)**
- **Endpoint initially accessible by creator**
- **Endpoint not visible?**
  - Primary identity is your institutional ID?
  - Link your Globus ID!

Configuring Globus Connect Server

Endpoint configuration

- **Globus service “Manage Endpoints” page**
- **DTN (Globus Connect Server) config**

  `/etc/globus-connect-server.conf`

  – Standard .ini format: `[Section] Option = Value`

  – To enable changes you must run:

  `globus-connect-server-setup`

  – “Rinse and repeat”

Common configuration options

- **Manage Endpoints page**
  - Display Name
  - Visibility
  - Encryption
- **DTN configuration file**
  - RestrictPaths
  - IdentityMethod (CILogon, Oauth)
  - Sharing
  - SharingRestrictPaths

Exercise: Make your endpoint visible

- **Edit endpoint attributes**
  - Change the name to something useful, e.g. <your_name> EC2 Endpoint
  - For the “Visible To” attribute select “Public - Visible to all users”
- **Find your neighbor’s endpoint**
  - Thanks to our superb security …you can access it too ☺

Path Restriction

- **Default configuration:**
  - All paths allowed, access control handled by the OS
- **Use RestrictPaths to customize**
  - Specifies a comma separated list of full paths that clients may access
  - Each path may be prefixed by R (read) and/or W (write), or N (none) to explicitly deny access to a path
  - '~' for authenticated user's home directory, and * may be used for simple wildcard matching.
- **e.g. Full access to home directory, read access to /data:**
  - `RestrictPaths = RW~,R/data`
- **e.g. Full access to home directory, deny hidden files:**
  - `RestrictPaths = RW~,N~/.*`

Exercise: Restrict access

- **Set** `RestrictPaths=RW~,N~/archive`
- Run **`globus-connect-server-setup`**
- **Access your endpoint as** ‘researcher’
- **What’s changed?**

Enabling sharing on an endpoint

- **In config file, set** `Sharing=True`
- Run **`globus-connect-server-setup`**
- **Use the CLI to flag as managed endpoint (also configurable via the web app)**

* Note: Creation of shared endpoints requires a Globus subscription for the managed endpoint

Limit sharing to specific accounts

- `SharingUsersAllow =`
- `SharingGroupsAllow =`
- `SharingUsersDeny =`
- `SharingGroupsDeny =`

Sharing Path Restriction

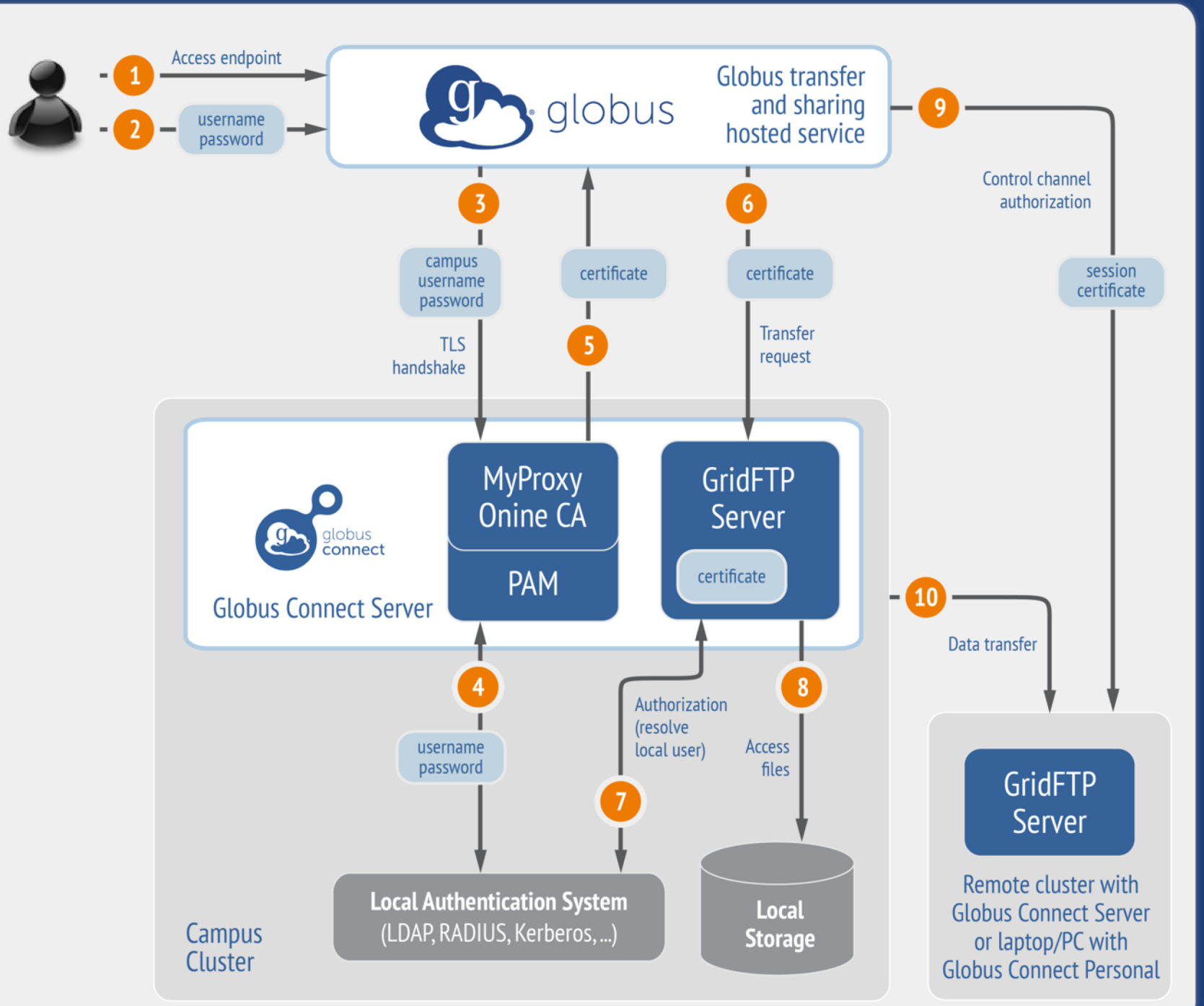
- **Restrict paths where users can create shared endpoints**
- **Use `SharingRestrictPaths` to customize**
  - Same syntax as `RestrictPaths`
- **e.g. Full access to home directory, deny hidden files:**
  - `SharingRestrictPaths = RW~,N~/.*`
- **e.g. Full access to public folder under home directory:**
  - `SharingRestrictPaths = RW~/public`
- **e.g. Full access to /proj, read access to /scratch:**
  - `SharingRestrictPaths = RW/proj,R/scratch`

Accessing Endpoints

Ports needed for Globus

- **Inbound: 2811 (control channel)**
- **Inbound: 7512 (MyProxy), 443 (OAuth)**
- **Inbound: 50000-51000 (data channel)**
- **If restricting outbound connections, allow connections on:**
  - 80, 2223 (used during install/config)
  - 50000-51000 (GridFTP data channel)

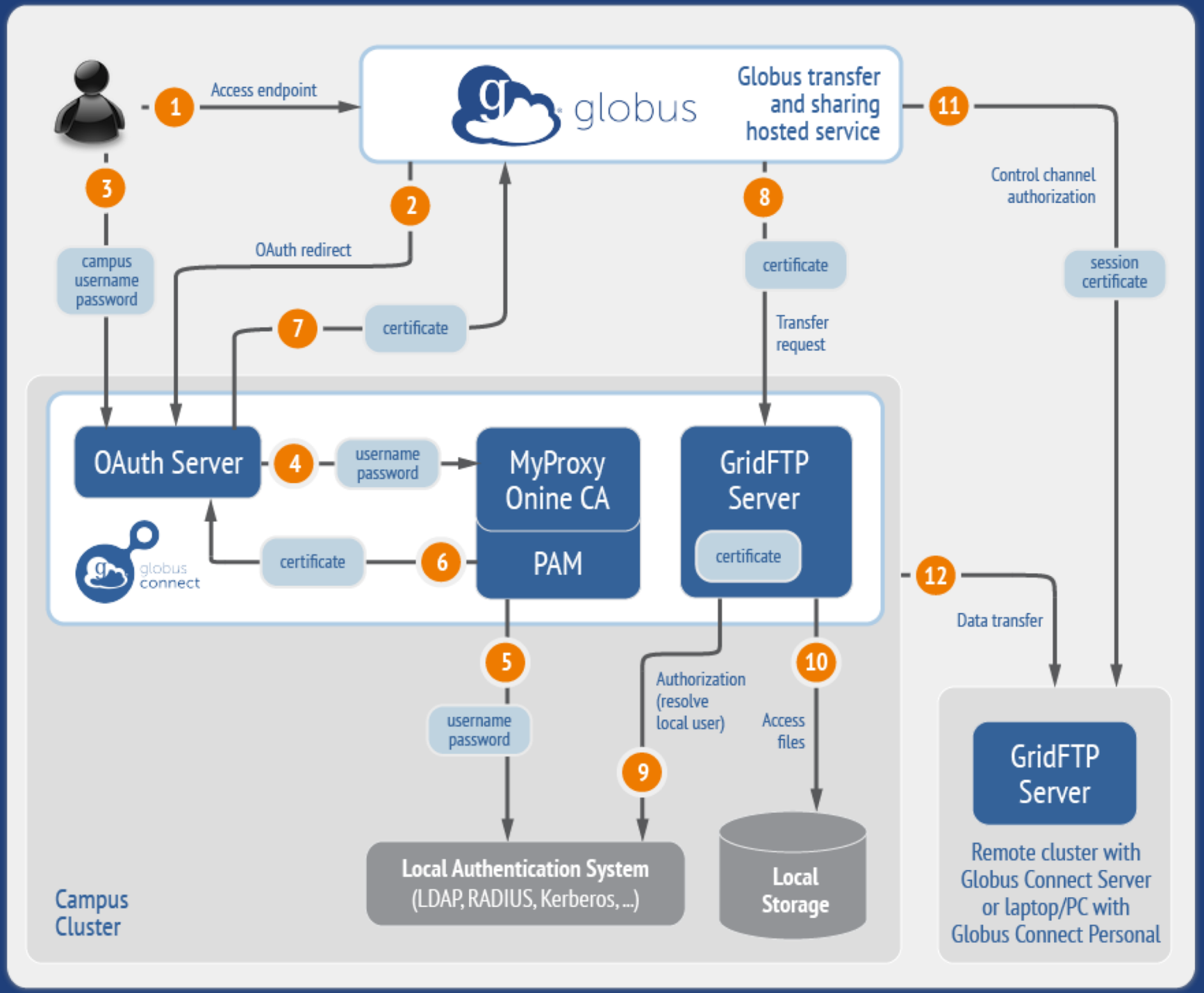
Endpoint activation using MyProxy



Default configuration

(*avoid if at all possible*)

Endpoint activation using MyProxy OAuth



Best practice configuration

Single Sign-On with InCommon/CILogon

- **Your Shibboleth server must release R&S attributes to CILogon—especially the ePPN attribute**
- **Local account must match institutional ID (InCommon ID)**
  - Test by creating a local user with same name
- **In** `/etc/globus-connect-server.conf` **set:**

```
AuthorizationMethod = CILogon

CILogonIdentityProvider =
<institution_listed_in_CILogon_IdP_list>
```

High Assurance Endpoints

- **App instance isolation**
- **Additional authentication assurance (IdP locking)**
- **Comprehensive audit logging**
- **Require Globus Connect Server v5.2+**
  - New installation method (using client ID, secret)
  - New architecture/terminology

docs.globus.org/high-assurance/

Managed endpoints and subscriptions

Subscription configuration

- **Subscription manager**
  - Create/upgrade managed endpoints
  - Requires Globus ID linked to Globus account
- **Management console permissions**
  - Independent of subscription manager
  - Map managed endpoint to Globus ID
- **Globus Plus group**
  - Subscription Manager is admin
  - Can grant admin rights to other members

Creating managed endpoints

- **Required for sharing, management console, reporting, …**
- **Convert existing endpoint to managed via CLI (or web):**

```
globus endpoint update --managed <endpt_uuid>
```

- **Must be run by subscription manager**
- **Important: Re-run `endpoint update` after deleting/re-creating endpoint**

Monitoring and managing Globus endpoint activity

Management console

- **Monitor all transfers**
- **Pause/resume specific transfers**
- **Add pause conditions with various options**
- **Resume specific tasks overriding pause conditions**
- **Cancel tasks**
- **View sharing ACLs**

Endpoint Roles

- **Administrator**: define endpoint and roles
- **Access Manager**: manage permissions
- **Activity Manager**: perform control tasks
- **Activity Monitor**: view activity

Demonstration:
Management console
Endpoint Roles
Usage Reporting

…on performance

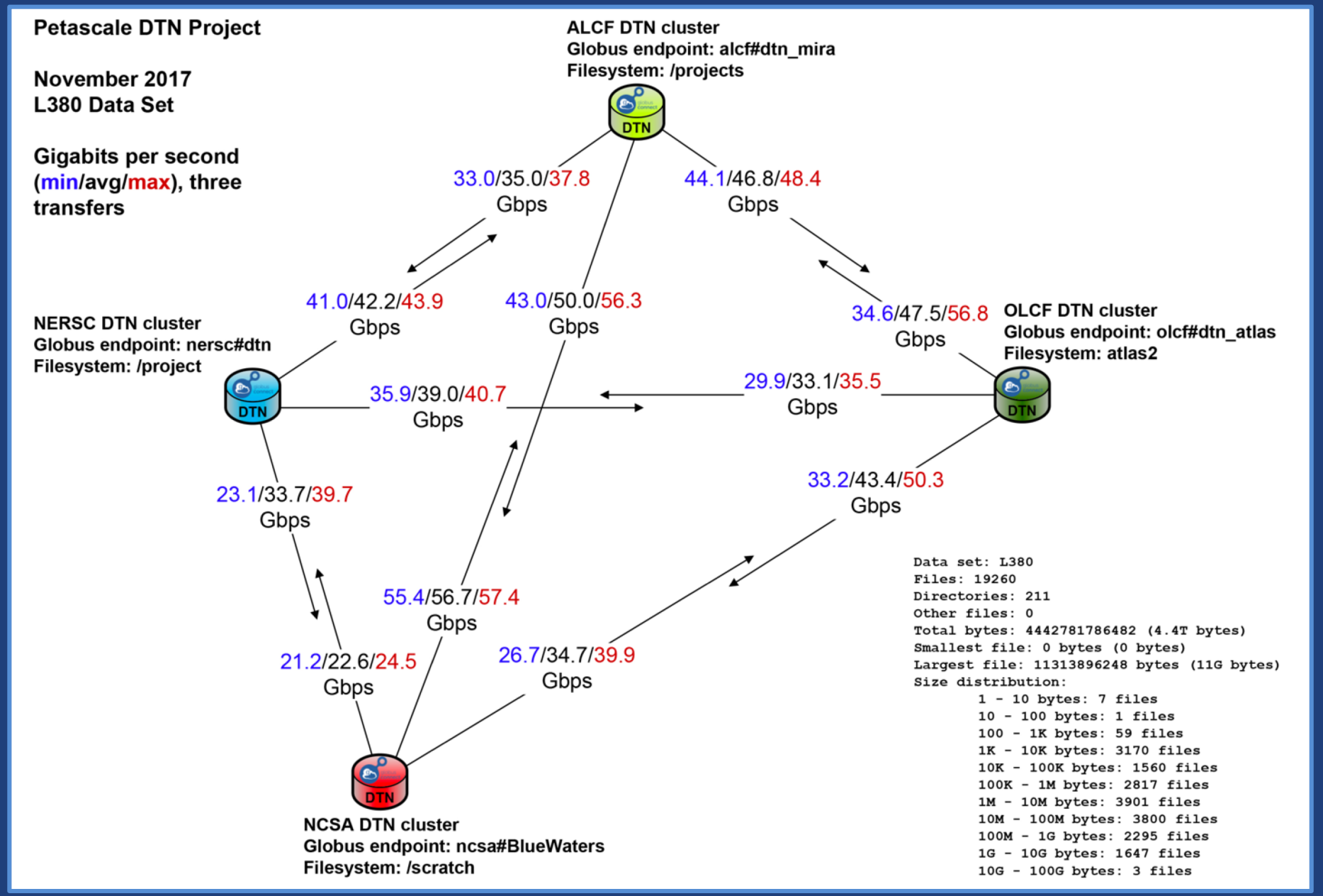
Balance: performance - reliability

- **Network use parameters: concurrency, parallelism**
- **Maximum, Preferred values for each**
- **Transfer considers source and destination endpoint settings**

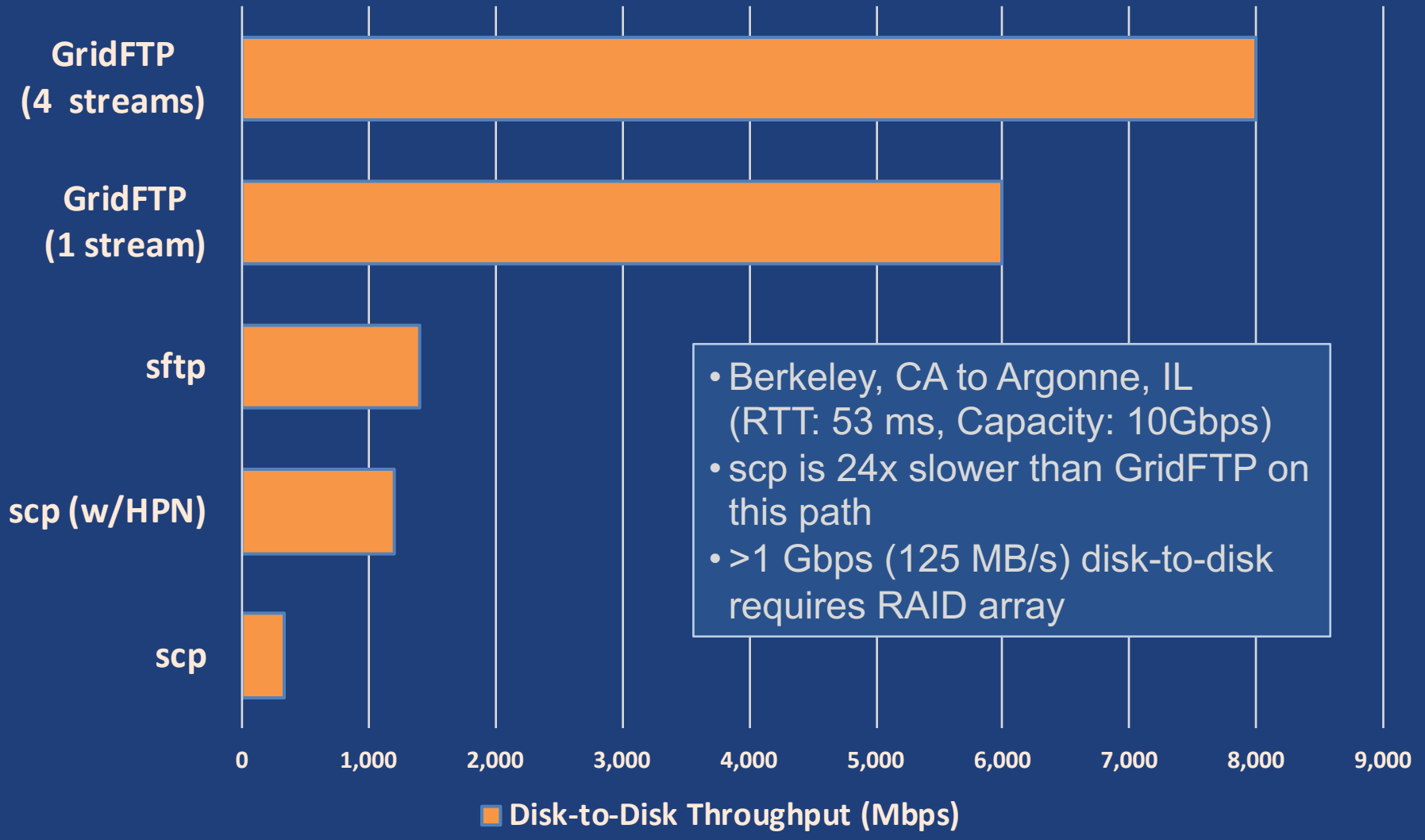
```
min(
  max(preferred src, preferred dest),
  max src,
  max dest
)
```

- **Service limits, e.g. concurrent requests**

Illustrative performance



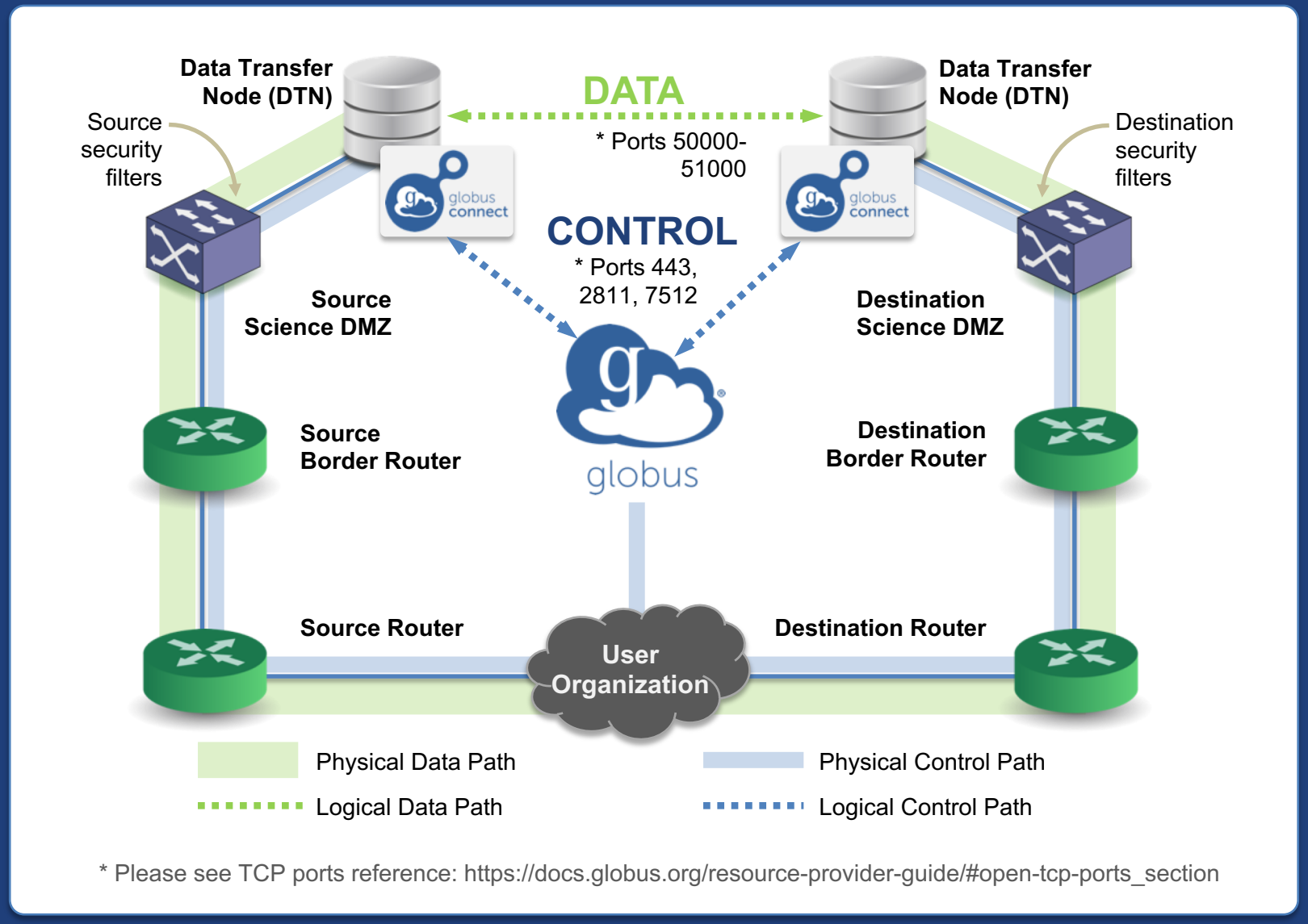
Disk-to-Disk Throughput: ESnet Testing



Source: ESnet (2016)

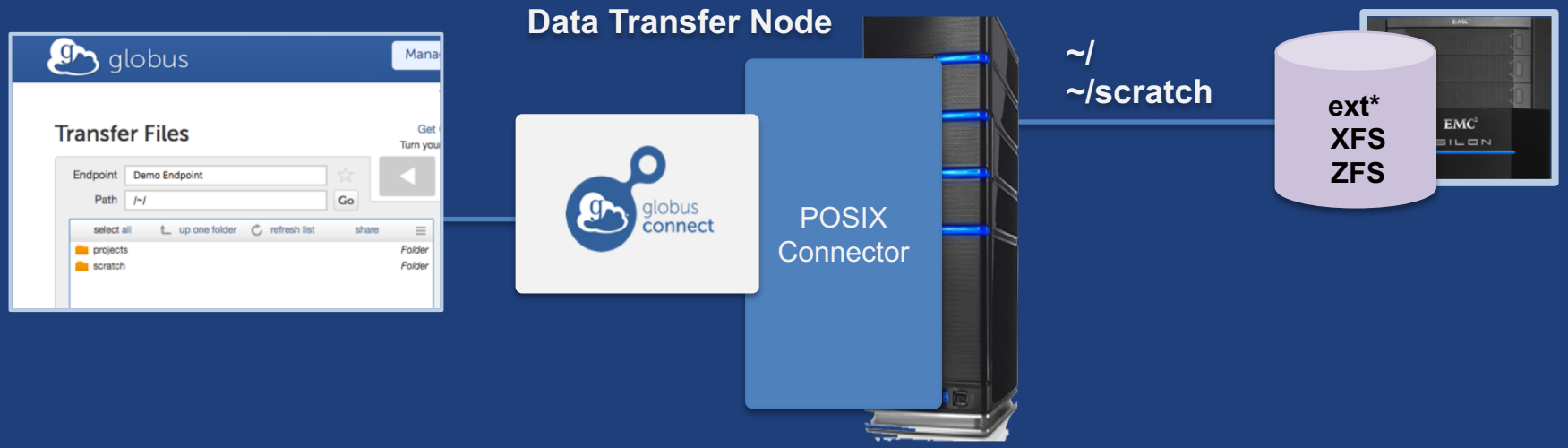
Deployment Scenarios

Best practice network configuration

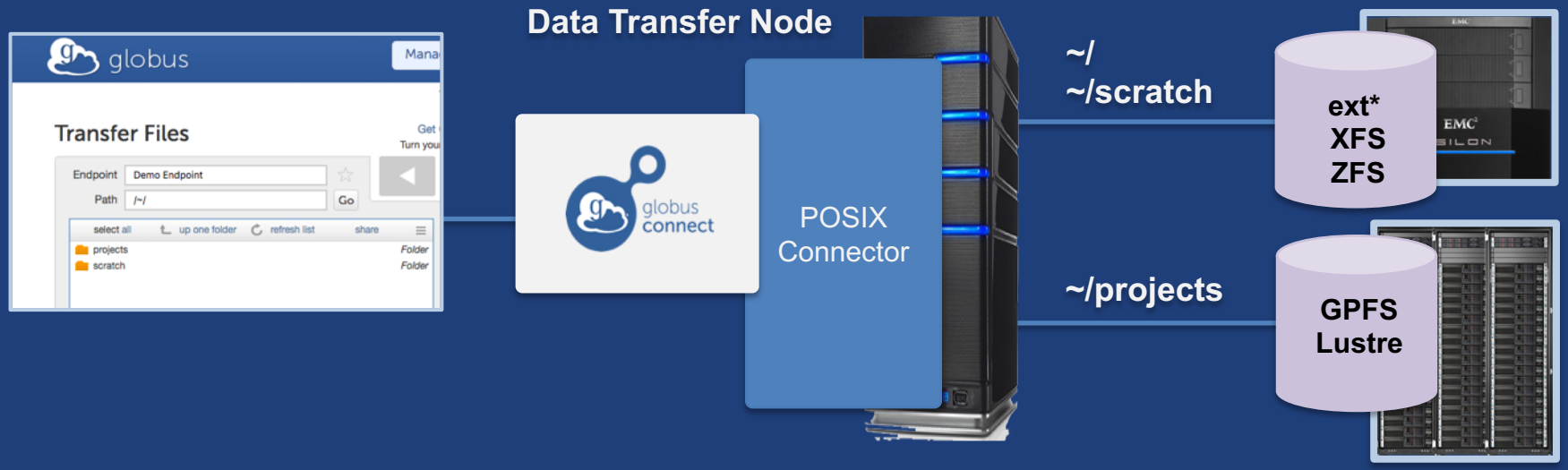


* Please see TCP ports reference: https://docs.globus.org/resource-provider-guide/#open-tcp-ports_section

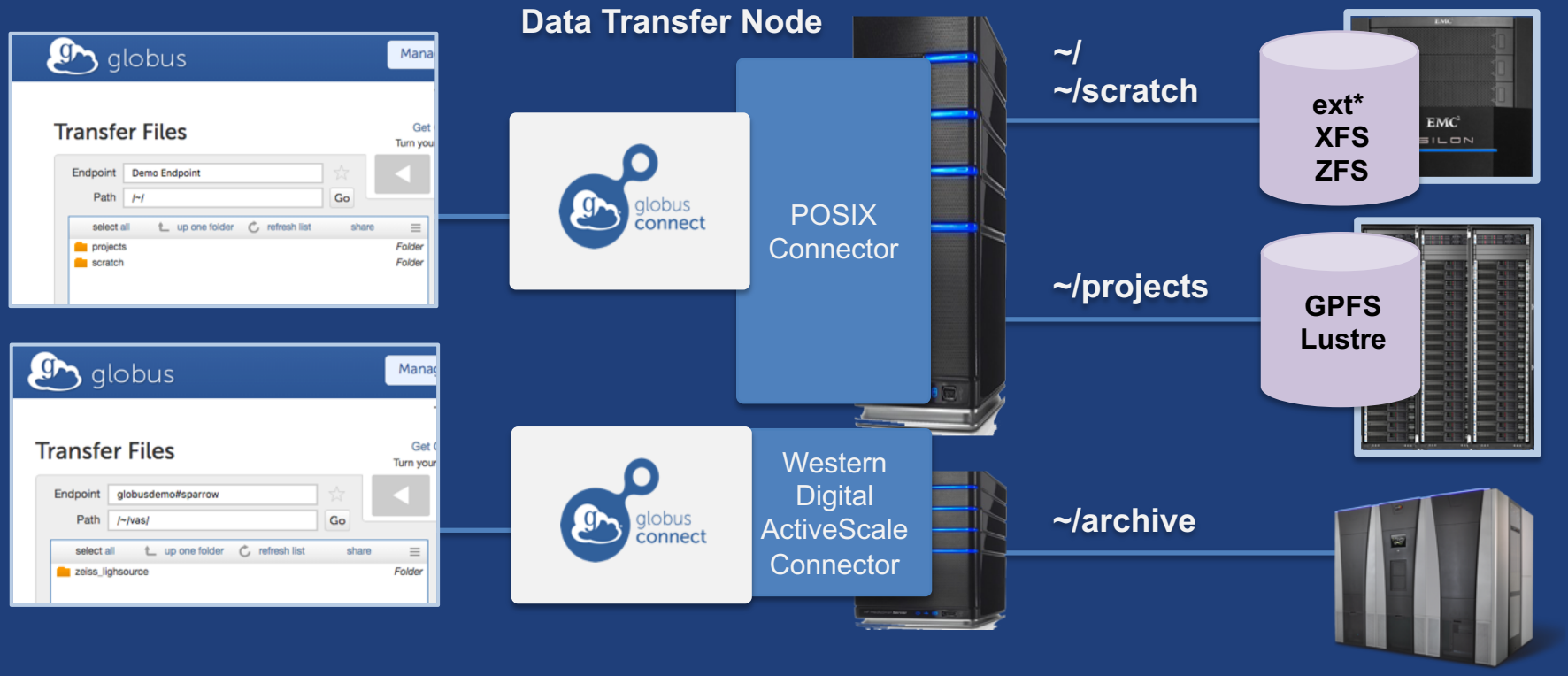
Common endpoint configuration



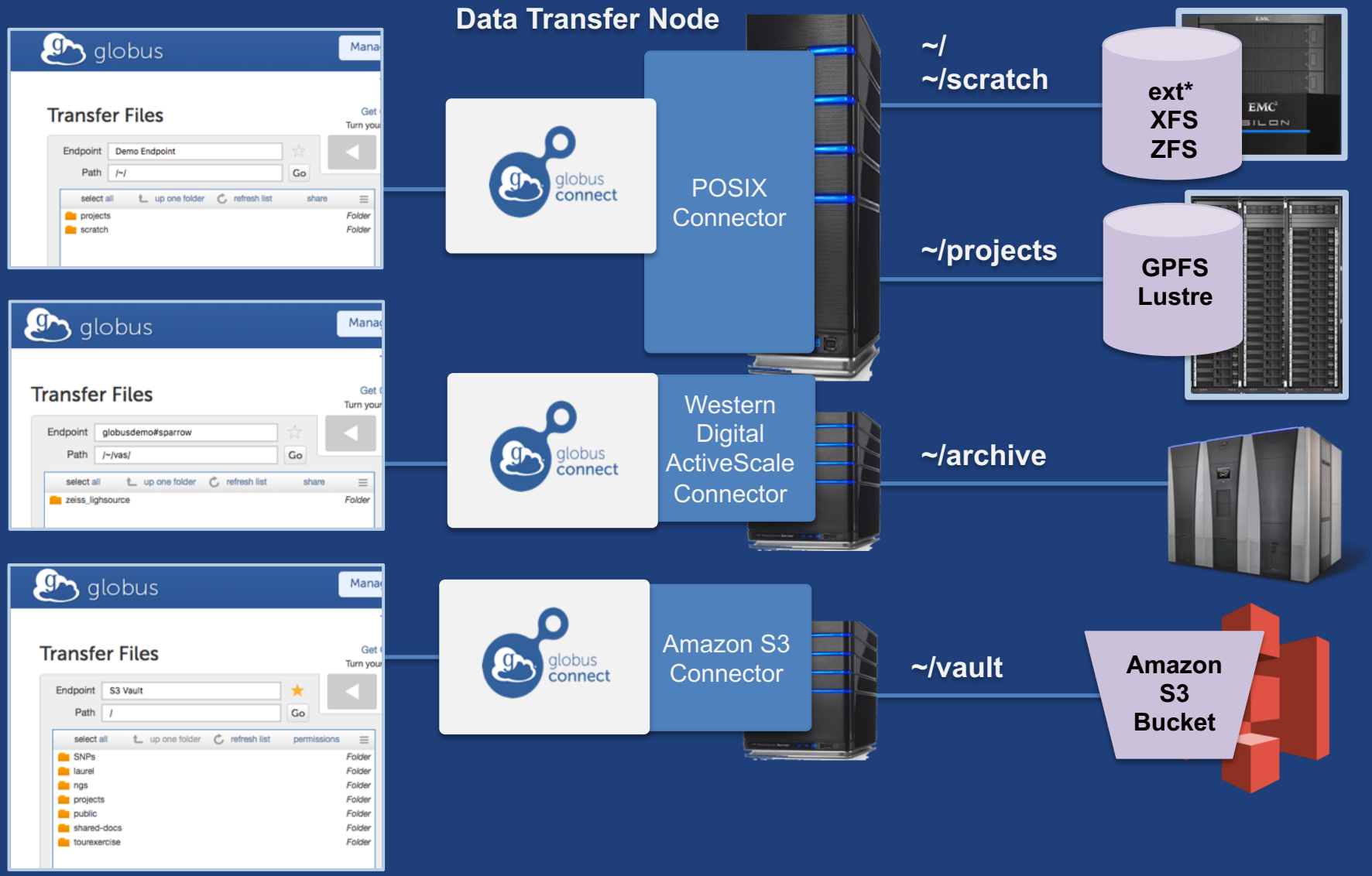
Common endpoint configuration



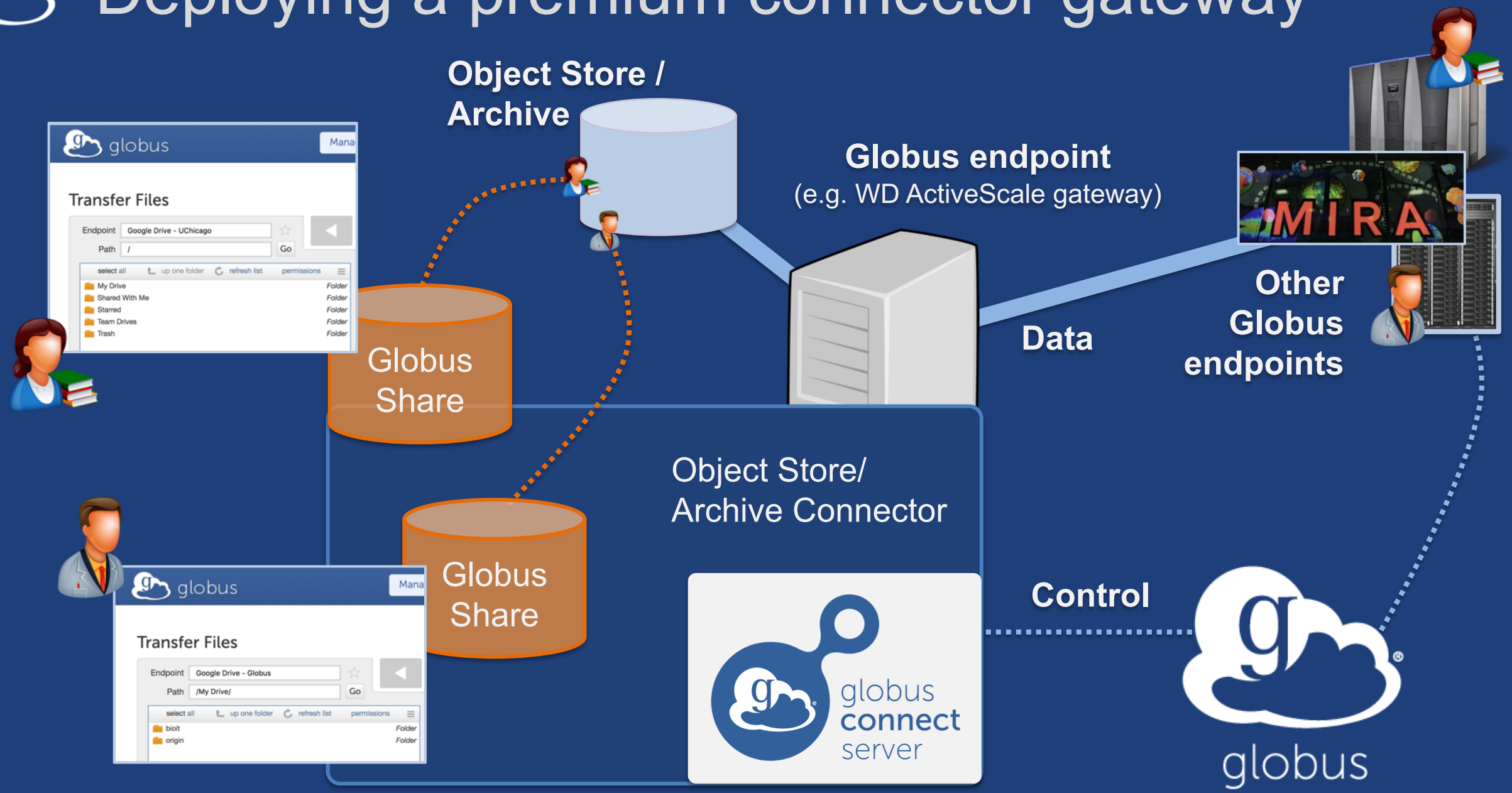
Multi-endpoint configuration



Multi-endpoint configuration



Deploying a premium connector gateway



Western Digital ActiveScale

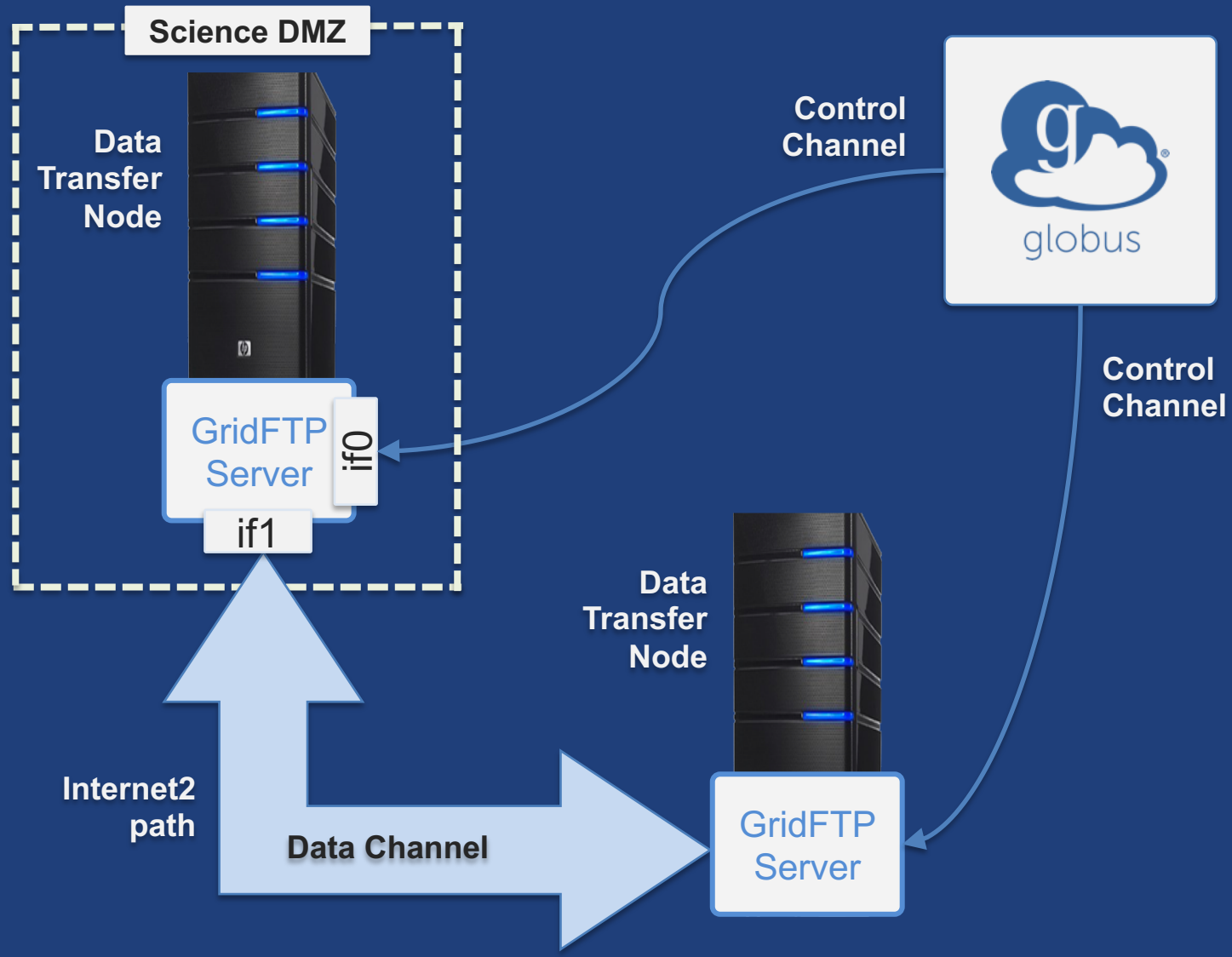
- Turnkey on-premise object storage
- Globus connector using S3 API
- Low TCO: Manufactures own drives
- Erasure coding
- Auto data integrity checks with self-healing
- Cloud-based systems management tools
- Data Forever: automatic migration to new tech

docs.globus.org/premium-storage-connectors/wd-activescale/

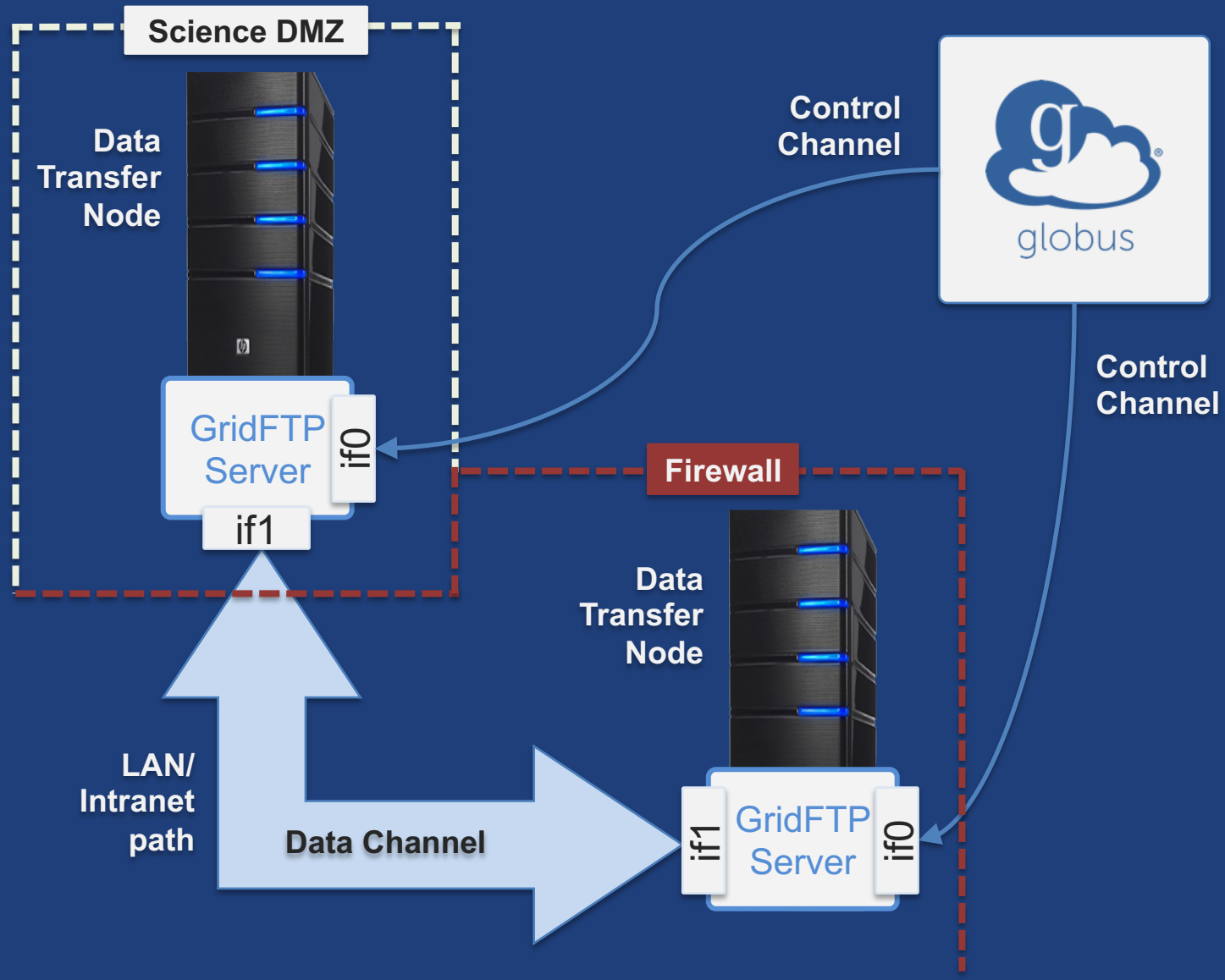
Network paths

- **Separate control and data interfaces**
- **"`DataInterface =`" option in globus-connect-server-conf**
- **Common scenario: route data flows over Science DMZ link**

Dual-homed DTN – high speed data path



Dual-homed DTN – high speed data path



Other Deployment Options

Encryption

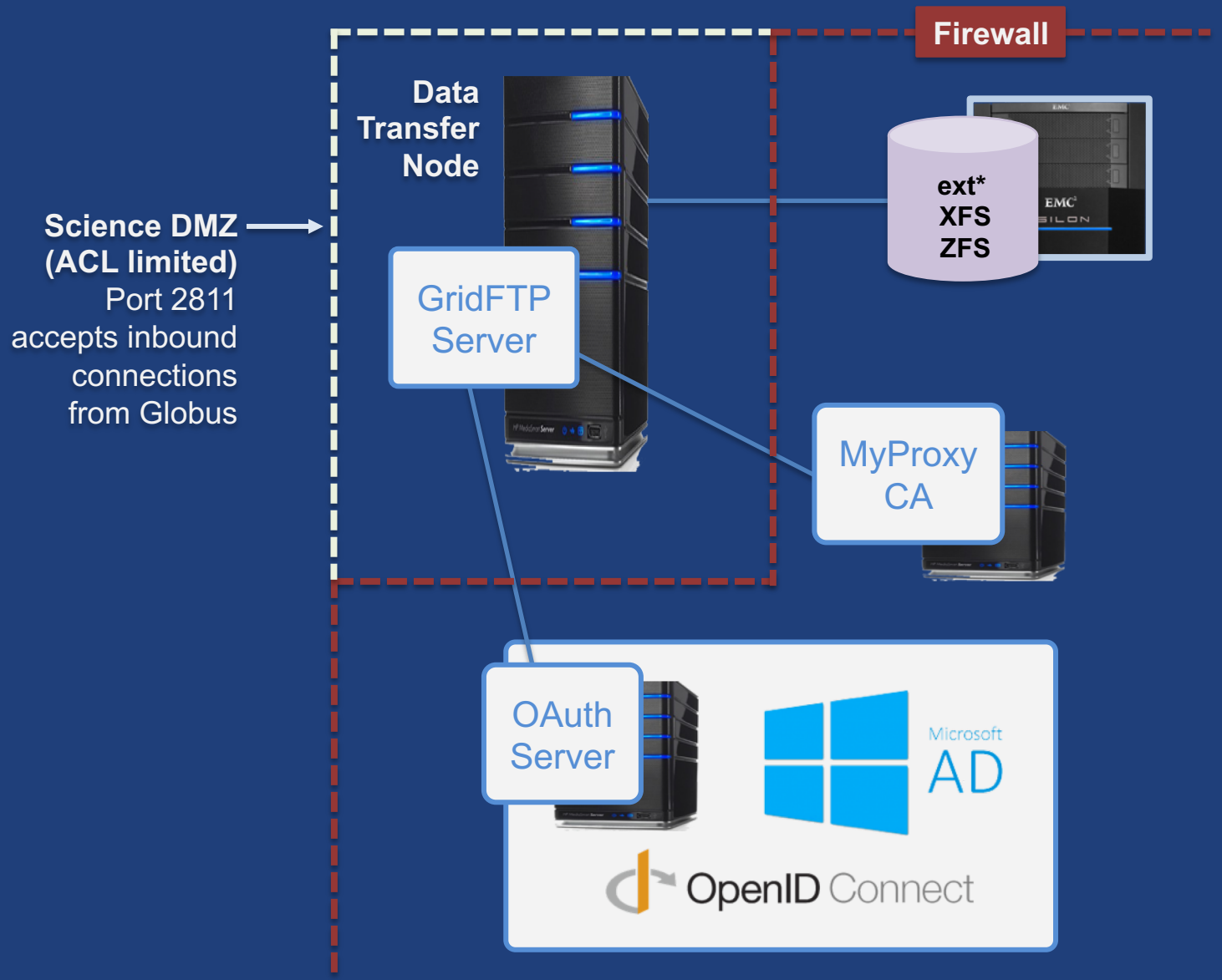
- **Requiring encryption on an endpoint**
  - User cannot override
  - Useful for “sensitive” data
- **Globus uses OpenSSL cipher stack as currently configured on your DTN**
- **FIPS 140-2 compliance: ensure use of FIPS capable OpenSSL libraries on DTN**

www.openssl.org/docs/fips/UserGuide-2.0.pdf

Distributing Globus Connect Server components

- **Globus Connect Server components**
  - `globus-connect-server-io, -id, -web`
- **Default: -io, –id and –web on single server**
- **Common options**
  - Multiple –io servers for load balancing, failover, and performance
  - No -id server, e.g. third-party IdP
  - -id on separate server, e.g. non-DTN nodes
  - -web on either –id server or separate server for OAuth interface

Distributing Globus Connect Server components



Setting up multiple –io servers

- **Guidelines**
  - Use the same .conf file on all servers
  - First install on the server running the –id component, then all others
- **Install Globus Connect Server on all servers**
- **Edit .conf file on one of the servers and set [MyProxy] Server to the hostname of the server you want the –id component installed on**
- **Copy Globus Connect Server configuration file to all servers**
- **Run globus-connect-server-setup on the server running the –id component**
- **Run globus-connect-server-setup on all other servers**
- **Repeat steps 2-5 as necessary to update configurations**

Example: Two-node DTN

-id
-io


On “primary” DTN node (34.20.29.57):

/etc/globus-connect-server.conf

```
[Endpoint] Name = globus_dtn
[MyProxy] Server = 34.20.29.57
```

-io


On other DTN nodes:

/etc/globus-connect-server.conf

```
[Endpoint] Name = globus_dtn
[MyProxy] Server = 34.20.29.57
```

Globus Network Manager

For environments with super duper special network constraints…
(a.k.a. ”for the very brave”)

Globus Network Manager

- **Information from GridFTP to facilitate dynamic network changes**
- **Callbacks during GridFTP execution on local DTN**
- **Supplements information available via Globus transfer API**

Globus Network Manager Callbacks

- **Pre-listen (binding of socket)**
- **Post-listen**
- **Pre-accept/Pre-connect (no Data yet)**
- **Post-accept/Post-connect (data in flight)**
- **Pre-close**
- **Post-close**

Network manager use cases

- **Science DMZ Traffic Engineering**
  - Use SDN to dynamically route data path
  - Control path uses traditional route
- **Automated WAN bandwidth reservation**
  - OSCARS, AL2S
- **Note: All this requires custom code**

Open Discussion