CRIC tables for network and monitoring information

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Requirements

The LHCONE community has been looking for a database where to store network related information, such as:
- IPv4 and IPv6 prefixes used for LHCONE and LHCOPN
- Autonomous System Numbers (ASN, used by the BGP routing protocol)
- Available Bandwidth
- Acknowledge to LHCONE Acceptable Use Policy (AUP)
- NOC contact information
- Addresses of perfSONAR probes
- Links to Monitoring pages

Use

Originally requested by NOTED to map WLCG site names found in FTS to IP prefixes used by FTS Storage Nodes

The list of prefixes will be used to create filters to secure the LHCOPN and LHCONE routing tables

Operational and monitoring information will be useful to debug and solve network issues

NetworkRoute

RC Site	NetworkRoute	NetSite	spare NetSite	ASN	Subnets	limit	limit	collaborations
AGLT2	✏️⊞ AGLT2 IPv6	AGLT2 University of Michigan	AGLT2 Michigan State University	237	2001:48a8:68f7::/48	80	-1	WLCG, US-ATLAS, ATLAS
AGLT2	✏️⊞ AGLT2 P2P	AGLT2 University of Michigan	AGLT2 Michigan State University	229	192.41.238.0/28	80	-1	WLCG, US-ATLAS, ATLAS
AGLT2	✏️⊞ AGLT2_MSU	AGLT2 Michigan State University		229	192.41.236.0/23	100	-1	US-ATLAS, WLCG
AGLT2	✏️⊞ AGLT2_MSU IPv6	AGLT2 Michigan State University		237	2001:48a8:68f7:8001::/64	100	-1	US-ATLAS, WLCG
AGLT2	✏️⊞ AGLT2_UM	AGLT2 University of Michigan		229	192.41.230.0/23	80	-1	US-ATLAS, WLCG
AGLT2	✏️⊞ AGLT2_UM IPv6	AGLT2 University of Michigan		237	2001:48a8:68f7:1::/64	80	-1	US-ATLAS, WLCG
BNL-ATLAS	✏️⊞ BNL-ATLAS	BNL-ATLAS		43	192.12.15.0/24, 192.33.128.0/24, 2620:0:210::/48	400	400	WLCG, BelleII, US-ATLAS
CERN-PROD	✏️⊞ LHCOPN-P2P	CERN-AS513		513	192.16.166.0/24, 2001:1458:302::/48	-1	1300	
CERN-PROD	✏️⊞ MDC-ITS	CERN-AS513		513	188.184.0.0/17, 188.185.0.0/17, 137.138.0.0/16, 2001:1458:d00::/48	-1	-1	
CERN-PROD	✏️⊞ MDC-LCG	CERN-AS513		513	128.142.0.0/16, 188.184.128.0/17, 2001:1458:301::/48, 2001:1458:303::/48	400	1300	WLCG, DUNE, US-ATLAS, US-CMS
CERN-PROD	✏️⊞ PCC-IPv4	CERN-AS513		513	188.185.128.0/17	-1	-1	
FZK-LCG2	✏️⊞ FZK-LCG2	DE-KIT		58069	192.108.45.0/24, 192.108.46.0/23, 192.108.68.0/24, 2a00:139c::/45	100	200	WLCG, BelleII

NetworkRoute

Site: pointer to RC-Site
NetworkRoute: Descriptive Name for this record of prefixes (string)
Primary NetSite: pointer to NetSite for additional Network Information
Spare NetSite: more specific NetSite, in case of multiple locations
ASN: Autonomous System Number (integer)
Subnets: list of IPv4 and IPv6 prefixes with common routing
More Specific: set to 1 if the prefixes are announced with more specific subnets
LHCONE limit: LHCONE bandwidth (Gbps) available for these prefixes. -1 if not connected
LHCOPN limit: LHCOPN bandwidth (Gbps) available for these prefixes. -1 if not connected
Collaborations: List of collaborations using these prefixes (e.g. WLCG, BelleII…)

NetSite

RC Site	NetSite	NOC	URL	AUP	LHCONE active	LHCOPN active	WAN	LHCONE	LHCOPN	providers
AGLT2	✏ ⊞ AGLT2 Michigan State University	aglt2-noc@umich.edu		✔	✔	✘	100	100	-1	ESnet
AGLT2	✏ ⊞ AGLT2 University of Michigan	aglt2-noc@umich.edu		✔	✔	✘	80	80	-1	ESnet
BNL-ATLAS	✏ ⊞ BNL-ATLAS	alezayt@bnl.gov hito@bnl.gov		✘	✔	✔	400	400	400	ESnet
CERN-PROD	✏ ⊞ CERN-AS513	noc@cern.ch	https://monit-grafana.cern.ch/d/000000204/lhcopn?orgId=14	✔	✔	✔	2000	400	1300	ESnet, GEANT, CERNlight
FZK-LCG2	✏ ⊞ DE-KIT	bruno.hoeft@kit.edu		✔	✔	✔	300	100	200	DFN
MWT2	✏ ⊞ MWT2 Indiana University	support@mwt2.org		✔	✔	✘	100	100	-1	ESnet
MWT2	✏ ⊞ MWT2 University of Chicago	support@mwt2.org		✔	✔	✘	100	100	-1	ESnet
MWT2	✏ ⊞ MWT2 University of Illinois Urbana-Champaign	support@mwt2.org		✔	✔	✘	100	100	-1	ESnet
Nebraska	✏ ⊞ T2_US_Nebraska	garhan.attebury@unl.edu	https://public.stardust.es.net/d/xAueBcH7k/lhc-data-challenge-interface-details?orgId=1&var-iface=kans-cr6::unl_se-620	✔	✔	✘	100	100	-1	ESnet
NIKHEF-ELPROD	✏ ⊞ NIKHEF-SCIENCE-PARK	noc@surfsara.nl		✔	✔	✔	200	100	100	GEANT
SARA-MATRIX	✏ ⊞ SARA-SCIENCE-PARK	noc@surfsara.nl		✔	✔	✔	200	100	100	GEANT
RC Site	NetSite	NOC	URL	AUP	LHCONE active	LHCOPN active	WAN	LHCONE	LHCOPN	providers

NetSite

Site: pointer to RC-Site
NetSite: NetSite name (string)
NOC: email address of Network Operation Centre
URL: URL to statistics/monitoring page
AUP: date of acknowledgement of LHCONE AUP
LHCONE active: yes/no
LHCOPN active: yes/no
WAN bandwidth: total WAN bandwidth for the site (general + LHCOPN + LHCONE)
LHCONE bandwidth: total LHCONE bandwidth (in Gbps). -1 if not connected
LHCOPN bandwidth: total LHCOPN bandwidth (in Gbps). -1 if not connected
LHCONE Providers: NREN(s) providing LHCONE access

Links

NetworkRoute: https://wlcg-cric.cern.ch/core/networkroute/list/

NetSite: https://wlcg-cric.cern.ch/core/netsite/list/

CRIC Network Information:
Use Cases and Expectations from Sites

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Overview of CRIC Network Information

The new networking information that Edoardo has described has a number of use-cases that shape what we want to record

- Having a single-source of truth for LHCONE networks to be used to manage LHCONE and supply information to various IRR (Internet Routing Registries).
- Correlating site services with networks.
- Supporting debugging network problems.
- Identifying infrastructure bottlenecks that involve the network.
- Monitoring the performance of our sites and their associated networks.

We now have a challenge to get the right information into CRIC to support all this.

Our goal is to have the WLCG CRIC be the single source of truth for WLCG network info.

Getting Site Information into CRIC

As part of the prototyping for adding network information into CRIC, we asked some network-savvy site admins to put in their information

- We ended up with each one doing things differently than the others

In this talk we want to provide some guidance and best practice suggestions

We need sites to add or update two "Tables" in CRIC: NetSites and NetworkRoute

Some information has been imported from the WLCG LHCONE Wiki already but likely has bugs.

NetSite

Edoardo showed the NetSite information on slide 7 above and we want to suggest guidance for sites filling this in.

If a NetSite doesn't exist for a given WLCG, it should be created in the RC Site

Most RC Sites should likely have only **ONE** NetSite. Exceptions are RC Sites that have more than one physical location; distributed sites

A couple fields can use some further explanation:

- The **NetSite** is the network site name describing something about this site. We suggest using "RC Site" + "short descriptive text", e.g., `AGLT2 University of Michigan`   This field provides users some hint about the network.
- **URL** (change to MonitoringURL) should be the link which provides total site traffic IN/OUT plots in real-time.
- **WAN** (Wide Area Network) field should be the total bandwidth in Gbits/sec summing over all the sites external links
- **LHCONE/LHCOPN** should be the amount of usable bandwidth (Gb/s) for each of these networks; -1 if not connected
- **provider** identifies the LHCONE connector (who provides your site LHCONE access, empty if not on LHCONE)

We will suggest adding a NetSiteURL to provide an optional location that sites provide which describes their network, equipment, configuration and may have maps or diagrams.

NetworkRoute

The NetworkRoute details are on slide 5 above and will likely be modified:

- Only have `NetSite` (no primary and secondary)
- Add `MonitoringURL` in case there is specific monitoring for the specified subnets

This table is intended to document all the network prefixes associated with a NetSite.

- Site admins should try to minimize the number of rows they add, e.g., if all other columns would be the same, add subnets in the same row

In the next two slides I will try to illustrate what should be done for two example sites: **BNL** and **AGLT2**

BNL Example (1)

RC Site	NetSite	NOC	URL	AUP	LHCONE active	LHCOPN active	WAN	LHCONE	LHCOPN	providers
BNL-ATLAS	✏ ⊞ US-BNL	itdhelp@bnl.gov		✔	✔	✔	0	100	100	ESnet

BNL represents a site with one NetSite.

Example above has some errors: WAN should be 400 Gb/s, LHCONE/LHCOPN should be 400 Gb/s. Should also add URL (`MonitoringURL`) and NetSite could have been BNL-ATLAS or BNL-T1

This one location has a number of networks, one set added manually and one from importing:

RC Site	NetworkRoute	primary NetSite	spare NetSite	ASN	Subnets	LHCONE limit	LHCONE limit	collaborations
BNL-ATLAS	✏ ⊞ BNL-ATLAS	BNL-ATLAS	manual	43	192.12.15.0/24, 192.33.128.0/24, 2620:0:210::/48	400	400	WLCG, BelleII, US-ATLAS
BNL-ATLAS	✏ ⊞ BNL-ATLAS-LHCOPNE	US-BNL	import	43	130.199.185.0/24 130.199.48.0/23 192.12.15.0/24, 2620:0:210::/48	200	100	WLCG

BNL Example (2)

The NetworkRoute example has various networks listed. The manually entered row has subnets for both WLCG/ATLAS and BelleII.   The imported line has two subnets (in red) not added manually. To fix this, BNL should have two NetworkRoute lines: One called BNL-ATLAS and one called BNL-BelleII

Remember we want to minimize the rows here but need to have all columns be correct

RC Site	NetworkRoute	primary NetSite	spare NetSite	ASN	Subnets	LHCONE limit	LHCONE limit	collaborations
BNL-ATLAS	✎ ▦ BNL-ATLAS	BNL-ATLAS	*manual*	43	192.12.15.0/24, 192.33.128.0/24, 2620:0:210::/48	400	400	WLCG, BelleII, US-ATLAS
BNL-ATLAS	✎ ▦ BNL-ATLAS-LHCOPNE	US-BNL	*import*	43	130.199.185.0/24 130.199.48.0/23 192.12.15.0/24, 2620:0:210::/48	200	100	WLCG

Example AGLT2

RC Site	NetSite	NOC	URL	AUP	LHCONE active	LHCOPN active	WAN	LHCONE	LHCOPN	providers
AGLT2	✏☰ AGLT2 Michigan State University	aglt2-noc@umich.edu		✔	✔	✖	100	100	-1	ESnet
AGLT2	✏☰ AGLT2 University of Michigan	aglt2-noc@umich.edu		✔	✔	✖	80	80	-1	ESnet

AGLT2 represents an RC Site with two NetSites, one at University of Michigan and one at Michigan State University.

It is not connected to LHCOPN (not a Tier-1). It is missing MonitoringURL :(

It requires 4 rows in NetworkRoute (note different ASN for IPv4/IPv6)

RC Site	NetworkRoute	primary NetSite	spare NetSite	ASN	Subnets	LHCONE limit	LHCONE limit	collaborations
AGLT2	✏☰ AGLT2_MSU	AGLT2 Michigan State University		229	192.41.236.0/23, 192.41.238.0/28	100	-1	US-ATLAS, WLCG
AGLT2	✏☰ AGLT2_MSU IPv6	AGLT2 Michigan State University		237	2001:48a8:68f7:8001::/64	100	-1	US-ATLAS, WLCG
AGLT2	✏☰ AGLT2_UM	AGLT2 University of Michigan		229	192.41.230.0/23, 192.41.238.0/28	80	-1	US-ATLAS, WLCG
AGLT2	✏☰ AGLT2_UM IPv6	AGLT2 University of Michigan		237	2001:48a8:68f7:1::/64	80	-1	US-ATLAS, WLCG

Summary

We will need to do some more tweaking on the specific data fields but we are very close.

CRIC could provide useful API calls and checks on the data ("Which NetSite is IP address w.x.y.z in?", "What perfSONAR is associated with NetworkRoute X?", etc)

A document describing the details for each column in NetSite and NetworkRoute should be created to guide users in properly filling out the values for their sites.

Questions, Comments, Discussion ?