

Network Operations at CERN



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Multi-purpose, multi-vendor network infrastructure
Internet connectivity, Experimental instruments, LCG, Internet Exchange (CIXP)

...Where the web was born

3 distinct multi-ten-gigabit backbones

150+ very high performance routers

3'700+ subnets

2200+ switches (increasing)

50'000 active user devices

80'000 sockets, 5'000 km UTP cable

400+ starpoints

5'000 km of fibers (CERN owned)

150 Gbps of WAN connectivity



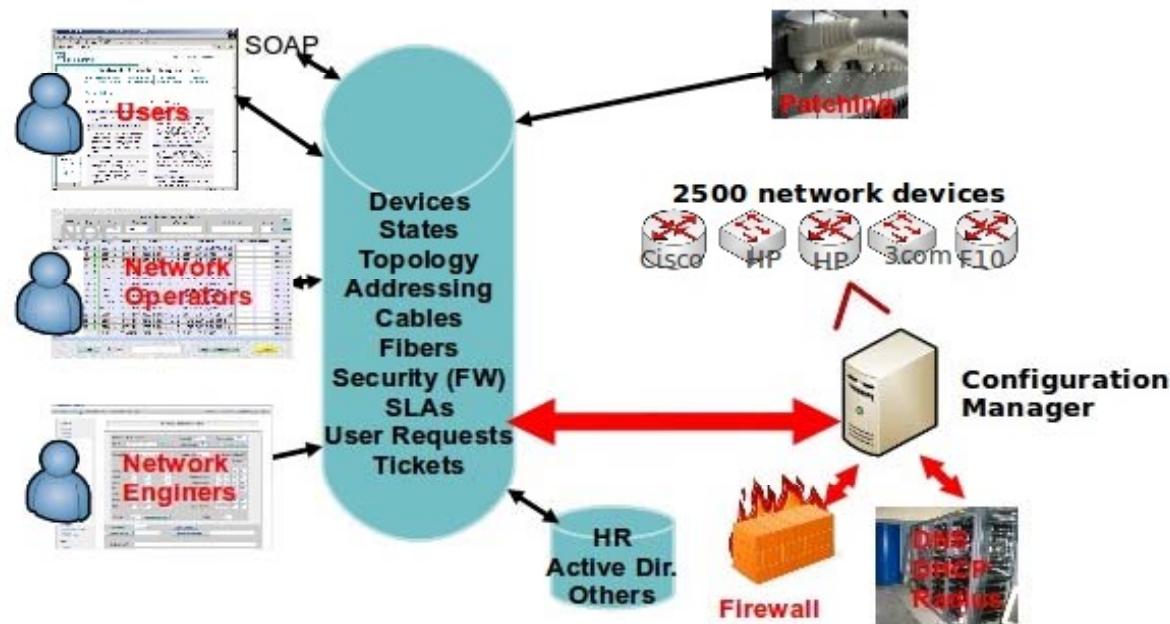
Extremely Dynamic environment → 2x more visitors than staff

1500 connection and change request / month

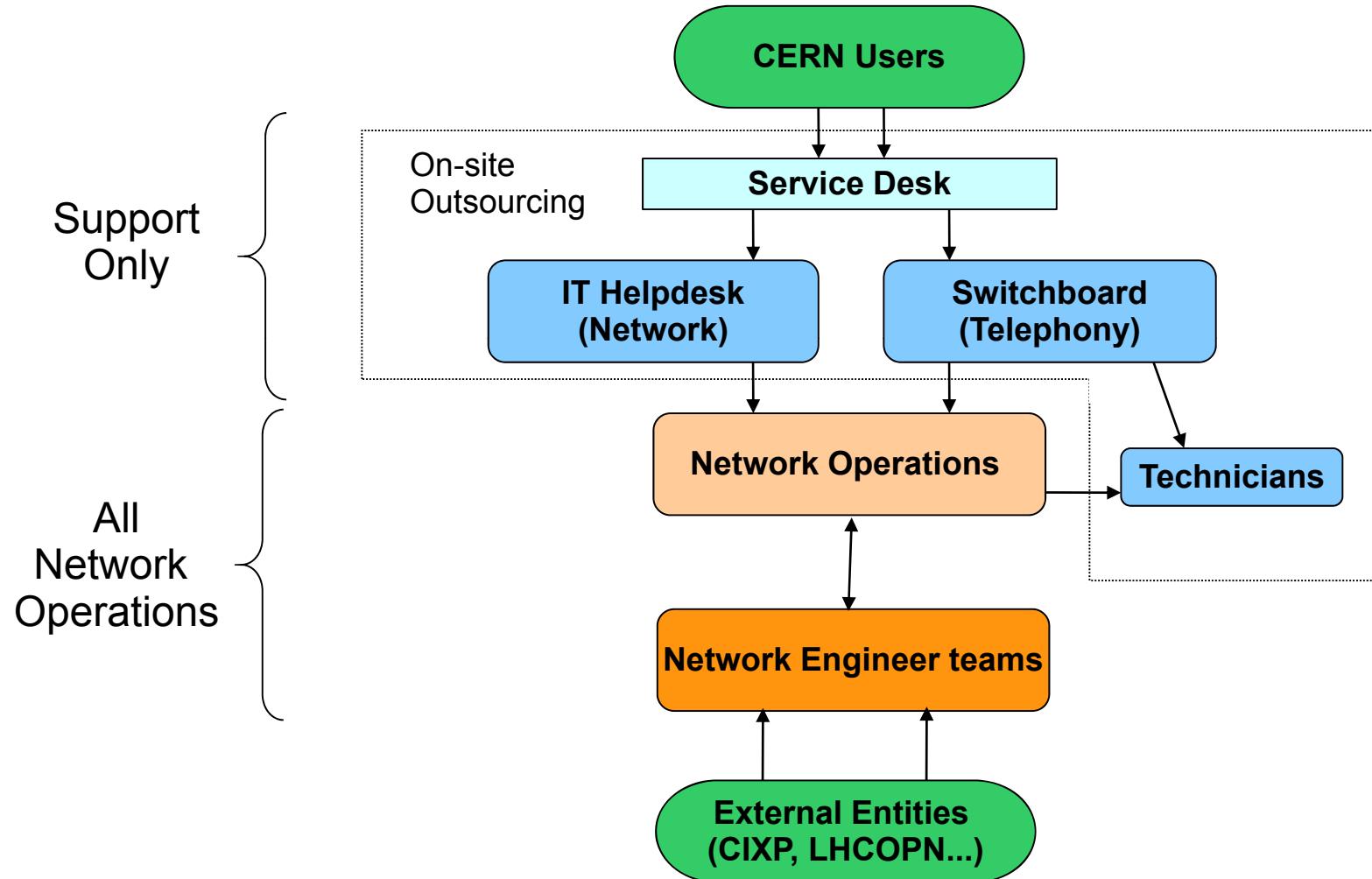
All centrally managed infrastructure

10+ years of development of our own NMS

- ~5 software developers
- Extremely high level of automation
- 500'000+ lines of code/150+ DB tables



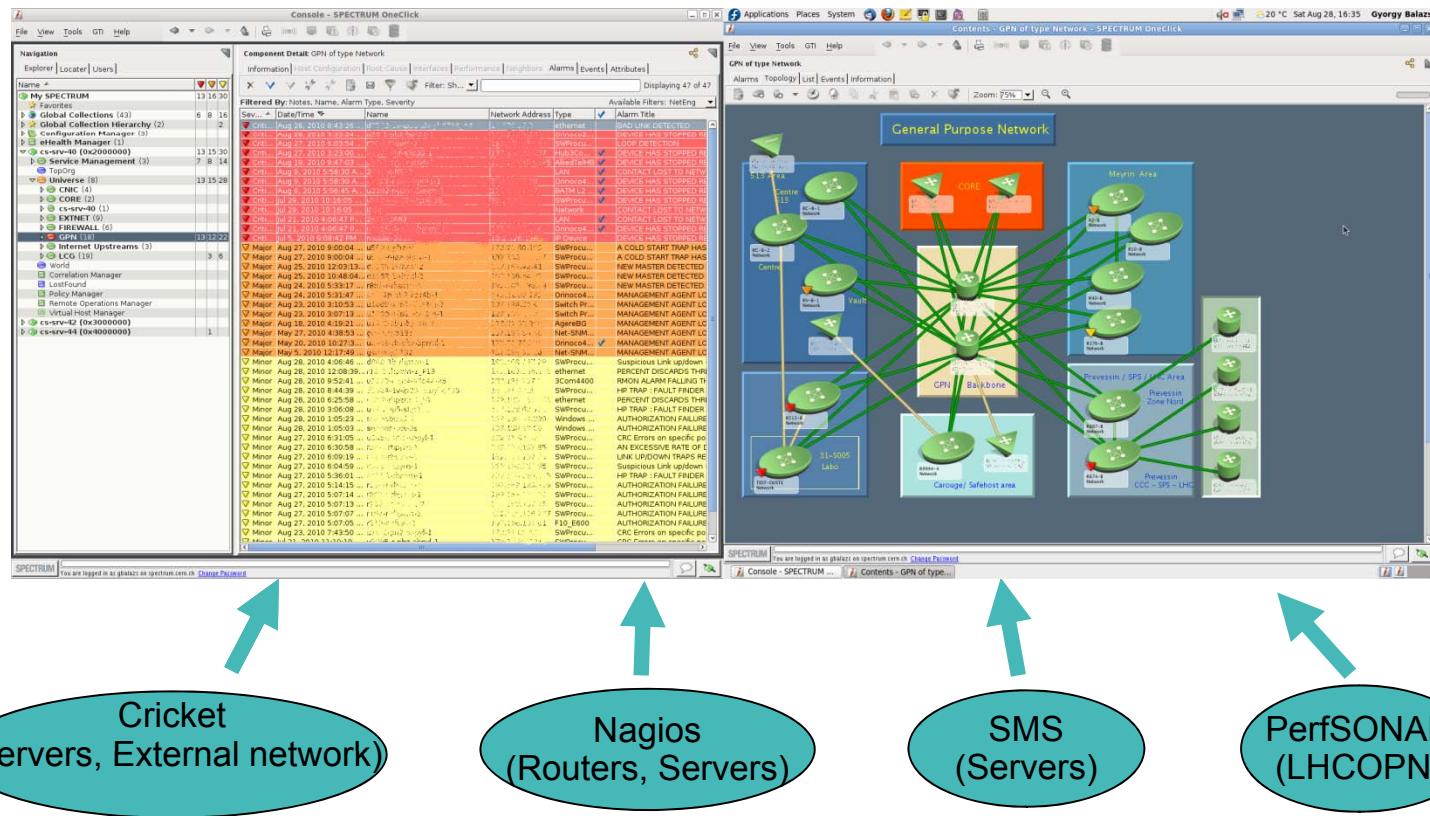
This allows for very limited manpower dedicated to operations





- **Operations: 3 non-degreed specialists dedicated during office hours**
 - **Monitoring:**
 - LAN, Telecom
 - **Support:**
 - LAN, Telecom
- **Engineer on duty: 6 engineers in daily rotation, ~10% load during office hours**
 - **Monitoring:**
 - LAN, WAN, Network services (DNS, DHCP...)
 - **(Advanced) Support:**
 - LAN, WAN, Network services, External entities
- **1 engineer dedicated to CIXP and Hosting services administration and support**
- **OWH by Computer Centre Operators**
 - **Monitoring, triggering urgent interventions**

Only commercial tool: CA Spectrum



+ Homegrown Statistics and Sflow based network behaviour and anomaly detection tools

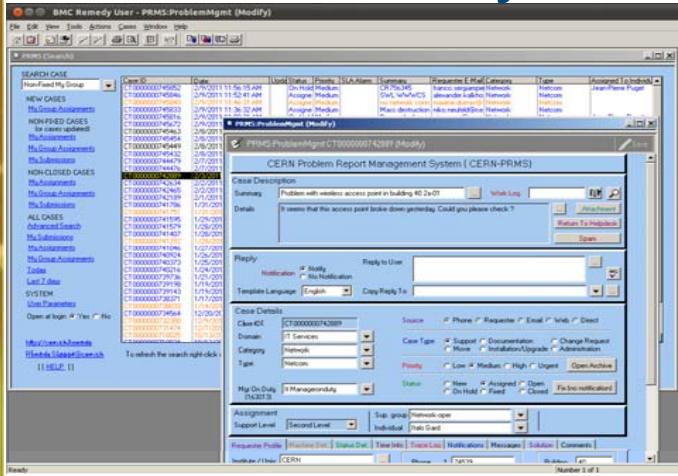
Network Support

Servicedesk → IT Helpdesk → Operations → Engineer teams

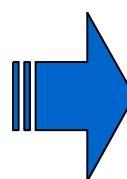
Final stage of ITIL implementation

Done on the organisation level, new ticketing tool

BMC Remedy



Service-Now



Case ID	Subject	Priority	Impact	Owner	Status	Type	Category	Source	Requester	Assignee	Due Date	Created	Last Update	Comments
INC011572	Roberto Alvarez Alonso	1 - Major	10-47-10	GS Service Management Support	Resolved	GS Service Management Support, 2nd Line						10-02-2011	10-02-2011	test notifications older than 10 days
INC011987	Sonia Molina Amoros	1 - Major	10-47-10	EDMS	Resolved	EDMS 2nd Line Support						10-02-2011	10-02-2011	do not touch
INC011986	Nathalie Lambert-cast	1 - Major	10-47-10	EDMS	Resolved	EDMS 2nd Line Support						10-02-2011	10-02-2011	Equipment Creation
INC012078	Barbara Isabelle Brugge	1 - Major	10-47-10	Palmistry	Assigned	Palmistry data an archive drawings						10-02-2011	10-02-2011	data is gis portal ne
INC011500	Claude Duscalul	2 - High	13-20-41	Workflow support	Closed	Workflow support 2nd Line Support						10-02-2011	13-20-41	incident in building
INC011711	Christian Theis	2 - High	11-30-03	Steel Structures	Waiting for user	Steel Structures 2nd Line Support						10-30-03	11-30-03	failure
INC011586	Renato Michel Yves Clemen	2 - High	13-24-24	Sanitary Equipment	Assigned	Sanitary Equipment 2nd Line Support						10-24-24	13-24-24	failure
INC011598	Susan Foffozo	2 - High	12-23-26	HVAC	In progress	HVAC 2nd Line Support						10-23-26	12-23-26	failure
INC011538	Vincent Doms	3 - Moderate	13-36-57	CERN Service Portal	Resolved	GS Service Management Support, 2nd Line						10-36-57	13-36-57	feedback general
INC011388		3 - Moderate	10-02-2011	Electrolysis	In progress	Electrolysis 2nd Line Support						10-02-2011	10-02-2011	no power in rack
INC011374		3 - Moderate	10-25-44	RJ20	Assigned	RJ20 2nd Line Support						10-25-44	10-25-44	Roots and Water Infiltration
INC011594	Christian Bossat	3 - Moderate	11-02-2011	Roots and Water Infiltration	Assigned	Roots and Water Infiltration 2nd Line Support						11-02-2011	11-02-2011	(taky) water infiltration in
INC011644	Severine Morize	3 - Moderate	16-20-41	Windows Desktops	Assigned	Windows Desktops 2nd Line Support						16-20-41	16-20-41	root infiltration in tree
INC011713	David Watch	4 - Low	14-02-2011	Persons Registration & Reception	In progress	Persons Registration & Reception 2nd Line						14-02-2011	14-02-2011	tree root in tree
INC011812	Vincent Doms	4 - Low	10-44-35	Physics DB Instances	Assigned	Physics DB Instances 2nd Line Support						10-44-35	10-44-35	inf10 database was not working in the morning
			11-02-2011	Service Desk	Resolved	Service Desk						11-02-2011	11-02-2011	Can you give access
					Done									

Network support tickets resolution ratio

Week (2011)	Total	IT Helpdesk	Operations	Helpdesk Ratio
1	65	36	29	55%
2	67	48	19	72%
3	94	54	40	57%
4	70	31	39	44%
5	106	68	38	64%

<6% of tickets are escalated to the engineering level



Inter-NOC communication

Intra-NOC

- Homegrown internal ticketing system, integrated with the NMS
 - SLA tracking of the outsourced-contracts included

Inter-NOC

- GGUS for LHCOPN
 - E-Mail

GTI Tickets List											
Your teams: First Line, TC firstline, S141 Firstline											
Building	StopPoint	Device	Telephone	Requested By	Assigned To	Category	Subcat	Status	Start Time	Time Left To Start*	Time Left To Finish**
Start time: Now									Search	Default order	Clear
									Get PDF	Get CSV	
<input type="checkbox"/> Ticket Number	Build StopPoint		Telephone Number	Requested By	Assigned To	Category	Subcat	Status	Start Time	Time Left To Start*	Time Left To Finish**
<input type="checkbox"/> P0904T1	0104 0104-BS			Satops	S141 Firstline	IP	New	CLOSED	08:42:43.0	56	96
<input type="checkbox"/> P0904T1	013V 013V-BS			Satops	S141 Firstline	IP	New	CLOSED	15:58:54.0	12	14
<input type="checkbox"/> P0904T1	-			Satops	S141 Firstline	IP	New	CLOSED	14:44:19.0	56	119
<input type="checkbox"/> P0904T1	217S 217S-BS			Satops	S141 Firstline	IP	New	DONE OK	17:21:20.0	-	-
<input type="checkbox"/> P0904T1	3294 3294-BS			Satops	S141 Firstline	IP	New	DONE OK	2011-02-09 15:27:08.0	-	-
<input type="checkbox"/> P0904T1	0051 0051-BS			Satops	S141 Firstline	IP	New	CLOSED	14:35:02.0	60	108
<input type="checkbox"/> P0904T1	0867 -			Satops	S141 Firstline	IP	New	DONE OK	14:22:27.0	-	-
<input type="checkbox"/> P0904T1	0867 0867-BS			Satops	S141 Firstline	IP	New	CLOSED	14:18:33.0	39	99
<input type="checkbox"/> P0904T1	0019 0019-BS			Satops	S141 Firstline	IP	New	DONE	14:13:54.0	-	-
<input type="checkbox"/> P0904T1	0019 0019-BS			Satops	S141 Firstline	IP	New	DONE	14:10:53.0	-	-
<input type="checkbox"/> P0904T1	-			72529	Switchboard	IP	Fixed	CLOSED	10:09:04.0	59	88
<input type="checkbox"/> P0904T1	0131 -			Satops	S141 Firstline	IP	New	DONE	08:36:17.0	-	-
<input type="checkbox"/> P0904T1	2619 -			Satops	S141 Firstline	IP	New	DONE OK	16:28:03.0	-	-
<input type="checkbox"/> P0904T1	0176 0176-BS			Satops	S141 Firstline	IP	New	CLOSED	13:56:36.0	57	87
<input type="checkbox"/> P0904T1	0013 -			Satops	S141 Firstline	IP	New	DONE OK	13:53:56.0	-	-



Documentation

Sharepoint collaboration workspace sites:

- Repository for support entities: All procedures for Operators, Technicians
- Change management logging

The screenshot shows a SharePoint list titled "Network" under the "Firstline Repository" category. The columns include Manufacturer, Name, Conn., Product ID, Title, Responsable, Validity, Version, and Modified. Items listed include various models from manufacturers like Compaq, 3COM, and Allied Telesis, such as the "Remplacement d'un switch 3COM 4900" and "Installation d'un Switch 3COM 4400".

Twiki for documentation

The Twiki page displays information about the Heartbeat service. It includes sections for "Information on Heartbeat" (linking to <http://www.linux-ha.org/doc/>) and "Files" (listing heartbeat configuration files like /opt/heartbeat/etc/ha.d/ha.cf). The sidebar contains links for CS Web Home, Changes, Index, Search, and Create personal sidebar.

LCG Savannah for tracking

The LCG Savannah interface shows a summary for the "ITCS-Proxim" group. It includes sections for "General CERN IT projects", "Cases submitted to Proxim", and "Membership Info" (listing members like Edwards Martelli and Cecileick Sebastian). Other sections include "Group Identification", "Search In This Group", and "Quick Overview" and "Latest News" panels.





Thank You!

CERN **IT**
Department

Q & A

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