

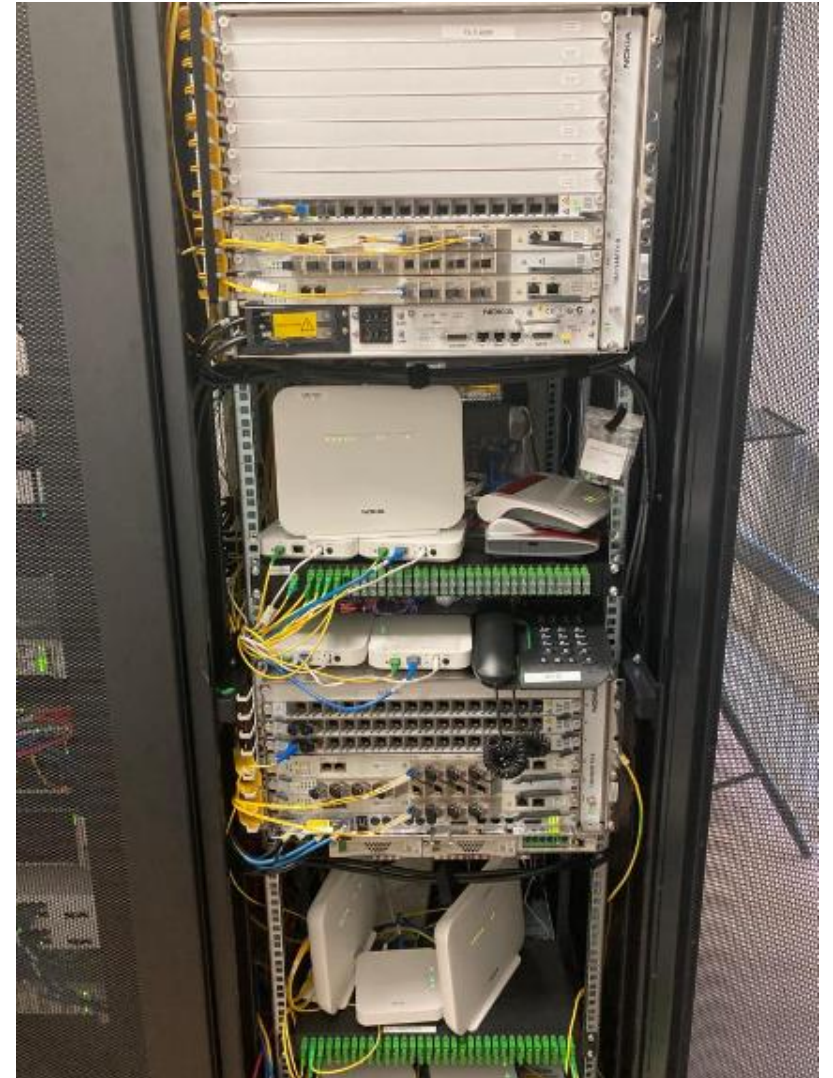
Fiber to the ~~Farm~~ Country

Rinse Kloek
September 2022

FIBER TO THE COUNTRY: BUILDING A NEW NETWORK

■ Topics

- Current status FTTH in Netherlands
- Why (XGS-)PON and not P2P
- (XGS-)PON deep dive
- Activation / Automation
- Questions

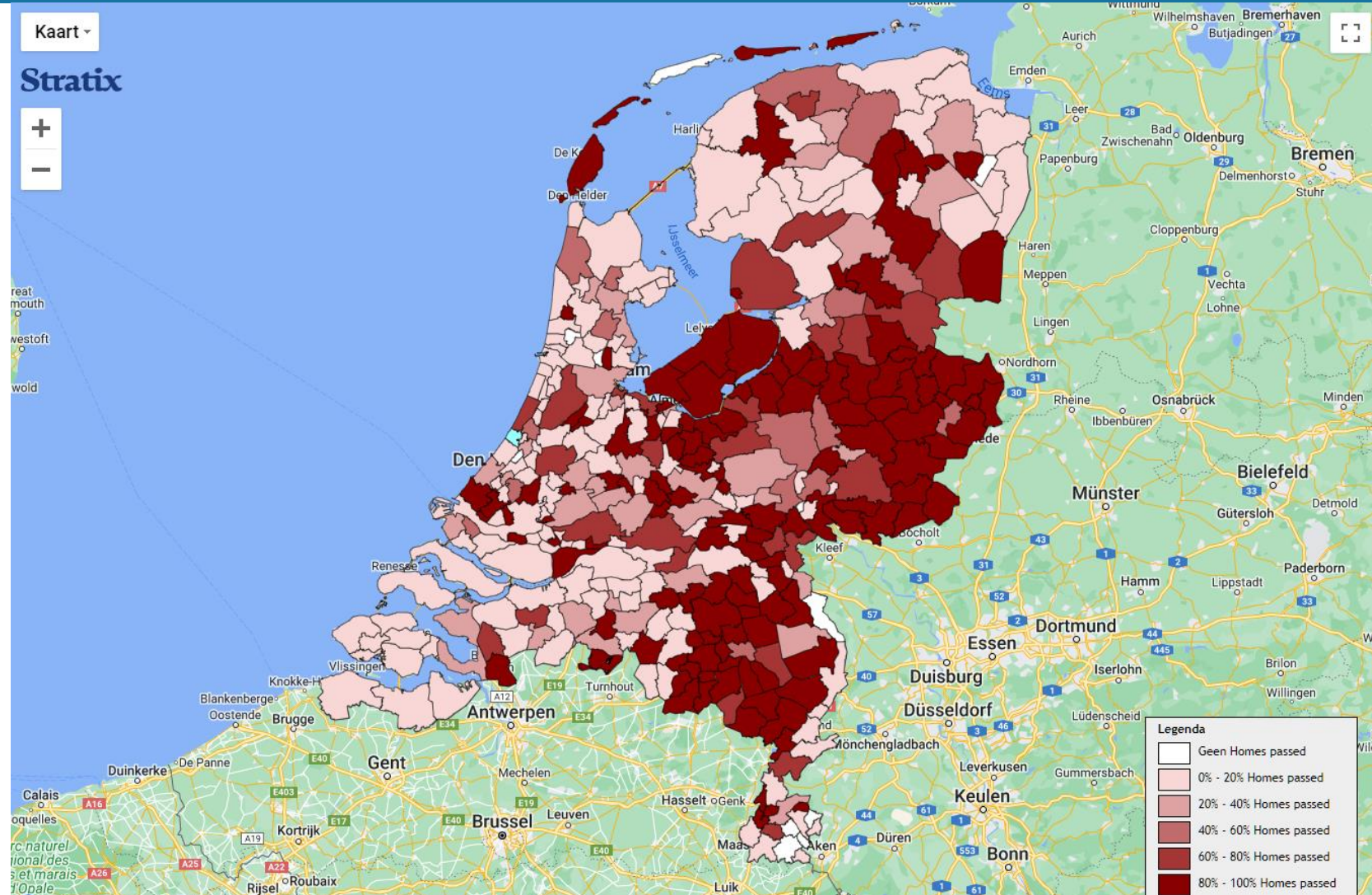


INTRODUCTION

- Rinse Kloek, freelance network engineer.
 - 20 years experience @ ISP Sector
 - Proud owner of all different NLNOG T-Shirts
- DELTA Fiber, merger of Caiway and Zeelandnet/Delta
 - DELTA Fiber is building the new Delta Fiber Network
 - Target to build 2 million FTTH connections



FIBER TO THE FARM => COUNTRY => NL: THE BATTLE!



LAYER 1: FIBER TO MY OWN HOME – THE PROCESS

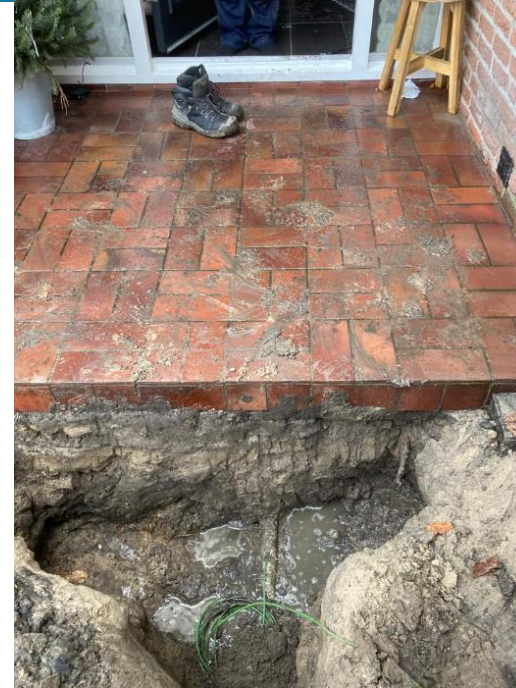


Cityring ducts to POP's + home connections

June 2021



Garden shooting with Torpedo July 2021



Using existing electric power pipe to get fiber into home
(Doorstep in the way)

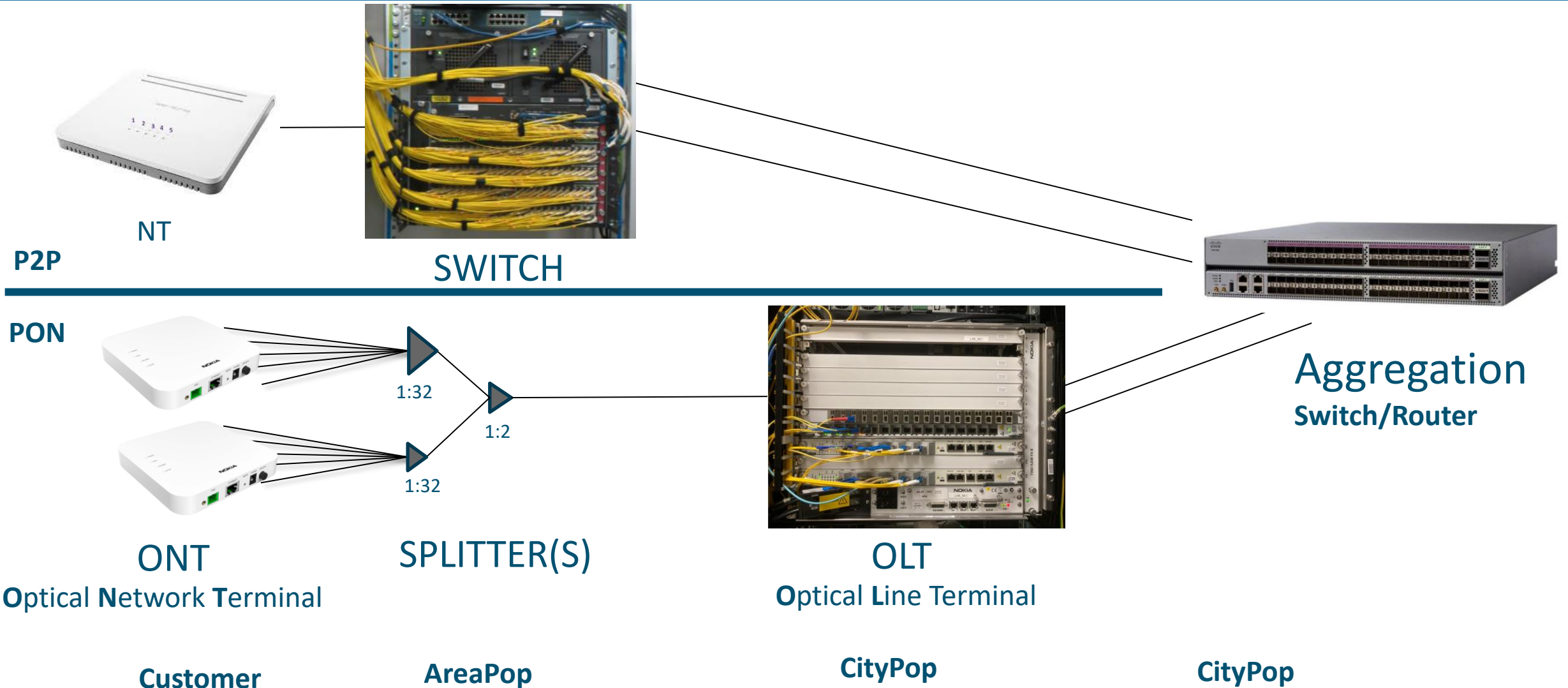
24 december 2021



Fiber Unit in Meter cupboard
Yes finally ready for lightning speed Internet!

30 januari 2022

CHOICE OF NETWORK TECHNOLOGY: P2P VS PON

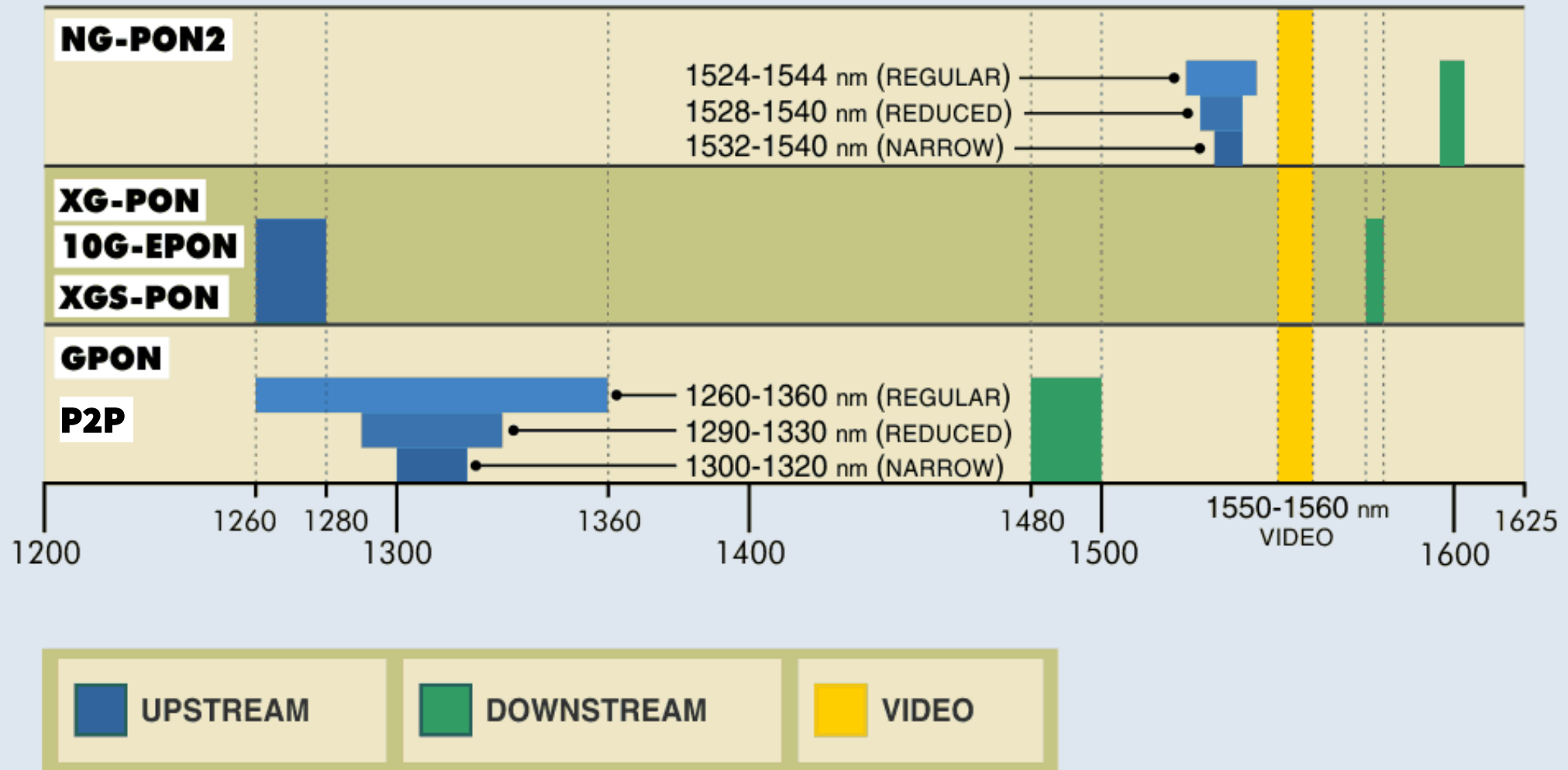


CHOICE OF NETWORK TECHNOLOGY P2P VS PON

	P2P	G-PON	XGS-PON
Flexibility in layer 1 network	-	++	++
Cost per Port	+/-	++	++
Oversubscription / Capacity	++	+/-	+
Power usage	--	++	++

XGS-PON has been chosen as a cost effective, future proof and **green** Network Technology

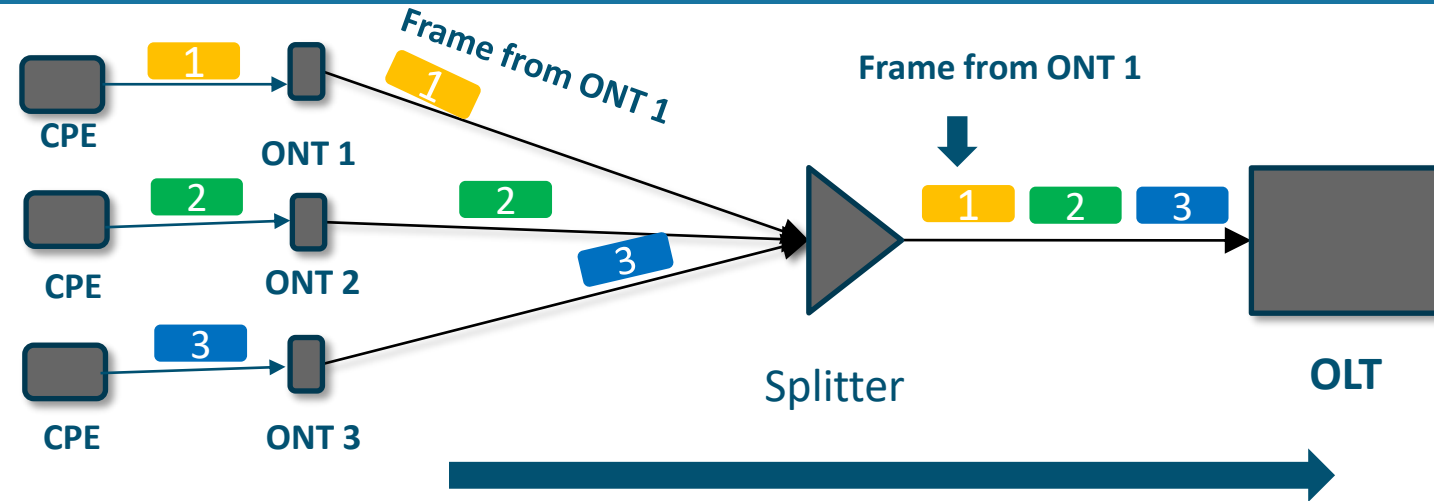
OPTICAL : GPON VS P2P VS XG(S)-PON VS NG-PON2



PON: UPLOAD AND DOWNLOAD, DIFFERENT TECHNIQUE

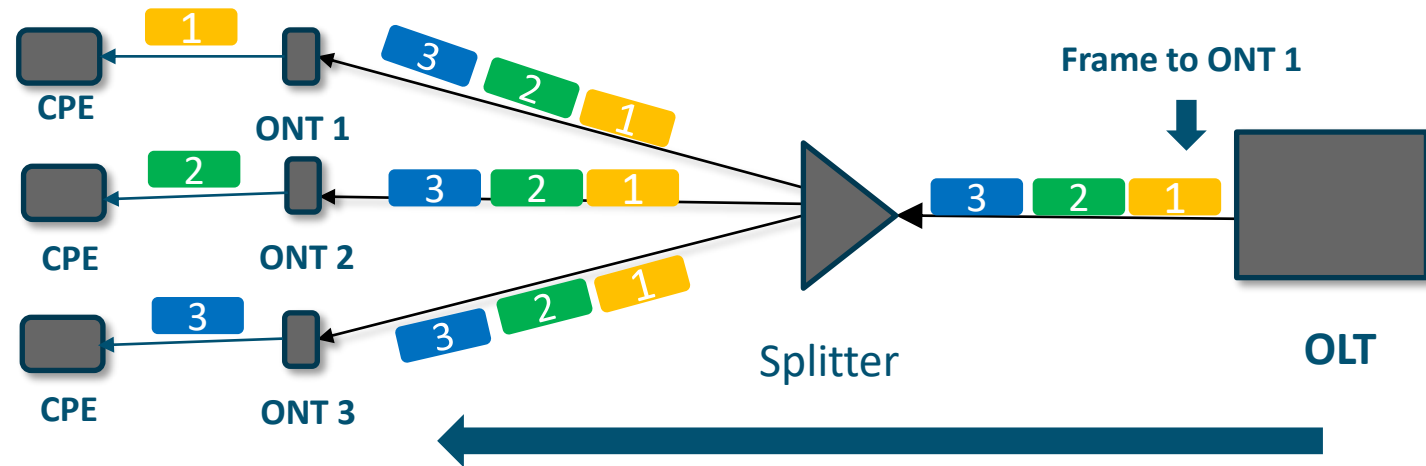
■UPSTREAM XGS-PON:

- 1270nm center wavelength
- 10 Gigabit per second(Shared)
- TDM (Time slots)
- AES encryption optional in XGS-PON
- FEC optional but recommended



■DOWNSTREAM XGS-PON:

- 1577nm center wavelength
- 10 Gigabit per second (Shared)
- Broadcast data to every ONT
- AES encryption strongly adviced
- FEC strongly adviced



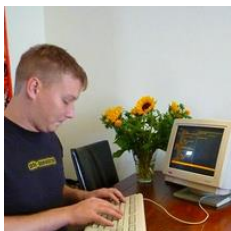
ACTIVATION PROCESS OF XGS-PON

- **Shared medium**, so we need to know what **ONT** is connected at which **customer**
- DELTA Fiber choose to do **Serial Number (PON ID) Pre registration**
- **Logistics process** to register which ONT with **<SERIAL NUMBER>** handed out to customer
- **Free Modem Choice**. You need to tell the PON ID to your Network Provider



IF IT ISN'T AUTOMATED DON'T TRUST IT

- **100s of OLTs** need to be auto provisioned with profiles/VLANs
- All work will be done by contractors (**Idiot proof!**)
-  **nautobot** chosen as CMDB/IPAM system for DELTA Fiber Network



- Using **Job** modules as easy wizards for adding new devices

- Build our own **Automation Service** using

API from OLT Vendor

API from Nautobot

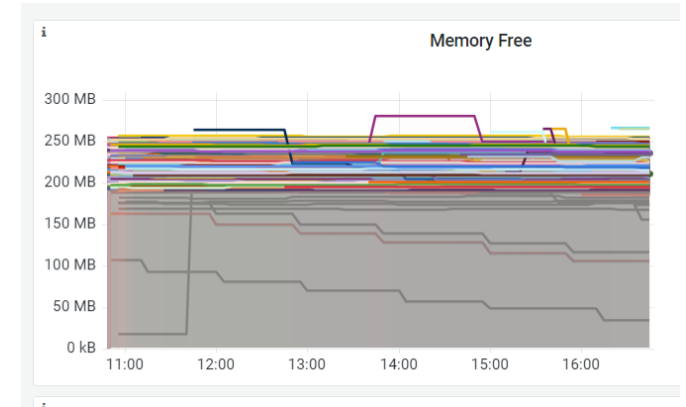
Some CLI/SFTP magic

Logs			
Time	Grouping	Level	Object
2022-08-10 12:17:53.743854	run	Success	wow-wp1-olt01
2022-08-10 12:17:53.754870	run	Info	lag-1
2022-08-10 12:17:53.775478	run	Success	Bundle-Ether10
2022-08-10 12:17:53.790823	run	Success	Bundle-Ether10
2022-08-10 12:17:53.812559	run	Info	svc1.port1.vlan3
2022-08-10 12:17:53.872302	run	Success	
2022-08-10 12:17:53.874506	run	Default	—
2022-08-10 12:17:53.881125	run	Info	nt-a.xfp:1
2022-08-10 12:17:53.901083	run	Info	TenGigE0/0/0/14
2022-08-10 12:17:54.030908	run	Success	wow-wp1:1
2022-08-10 12:17:54.037114	run	Info	nt-a.xfp:2
2022-08-10 12:17:54.059053	run	Info	TenGigE0/0/0/14
2022-08-10 12:17:54.184931	run	Success	wow-wp1:3
2022-08-10 12:17:54.185321	run	Default	—

```
2022-08-09 14:50:53,073 | INFO | OK OLT stwk-wp1-olt01 set to active in Nautobot
2022-08-09 14:50:53,442 | INFO | OK
2022-08-09 14:50:53,444 | INFO | Device stwk-wp1-olt01 has not status installed but: active
2022-08-09 14:50:53,445 | INFO | No action needed
2022-08-09 14:50:53,445 | INFO | Device stwk-wp1-olt01 has not status installed but: active
2022-08-09 14:50:53,445 | INFO | No action needed
2022-08-09 15:05:30,708 | INFO | OK Create Device && Device Config FX Intent stwk-wp2-olt01
2022-08-09 15:05:32,379 | INFO | OK Create Uplink Connection Intent stwk-wp2-olt01
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
2022-08-09 15:06:44,436 | INFO | OK Create Infra Intent for OLT stwk-wp2-olt01 template dfr
```


TALES FROM THE TRENCHES

- Reboot single ONT via PLOAM rebooted all (64) ONTs on 1 PON port
- ONT had **memory leaks** as seen by Grafana graphs of **ACS server**
- Downtime on all ports of splitter when connection **Alien XGS-PON optic**



CONCLUSIONS ABOUT XGS-PON

- **XGS-PON** is a market-ready technology to build your FTTH network
- Most issues are on the **ONT/RG (Routing Gateway) side** , OLT side is very stable.
- **Monitoring** the **ONT/RG** will help you detect strange issues ASAP
- **Automation** is key, automate everything as soon as possible
- Speeds up to **10G** are achievable, but hard to get on consumer grade devices

Gereed OneCheck Ethernet

TEST VOLT00ID

✓ **Locatie:** ONT
Profiel: 10G alternative
Datum: Jul 21, 2022, 12:31:51 PM

✓ **Service | snelheidscontrole**

8544 Mbps Downloaden | **8616 Mbps** Uploaden

✓ **Netwerk | IP-adres**

192.168.1.10 Companion-adres

✓ **Link | Ethernet**

18090459248 Ontvangen bytes | **20351768953** Verstuurd bytes

✓ **Physical | Electrical SFP Ethernet**

10 Gbps Snelheid | **Off** Automatische onderhandeling

THAT'S ALL FOLKS!

QUESTIONS ?

rinse@kindes.nl
rinse @ IRCNET

