

# 200G over Alien Wavelength

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DENOG9

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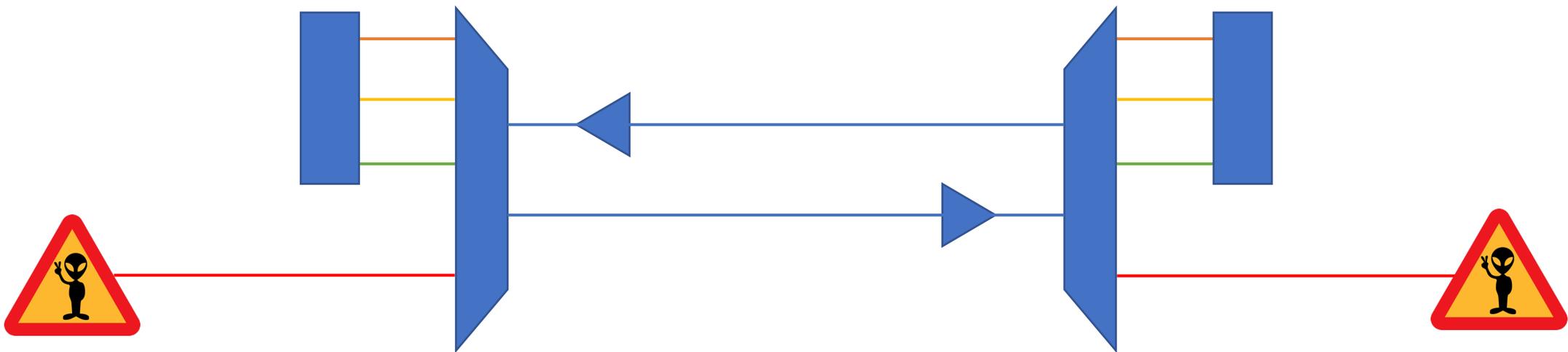
# Disclaimer

All experiences shared are from a Proof of Concept.  
Neither GasLINE nor Globalways are currently running a 200G Alien Wavelength in production.

This doesn't imply that we're not going to!

# Alien Wavelength aka BlackLink

- Specified within ITU.G698.2
  - For up to 10GBit/s
  - For  $\geq 50\text{GHz}$  Channel Spacing
- A single Channel Interface to an (existing) amplified DWDM-Network



The Network, aka the carrier

Marc, GasLINE

The Signal, aka the customer

Moritz, Globalways AG

# Motivation - Network



# Motivation - Network

- GasLINE is operating a national OTN-Backbone for customers
- Alien Wave is a solution between Dark Fiber and managed bandwidth in the OTN (OTU-X)

# Vendors opinions

- Vendors share different opinions
- Selling any DWDM-Hardware except transponders vs. selling nothing
- „Stop that project“ :

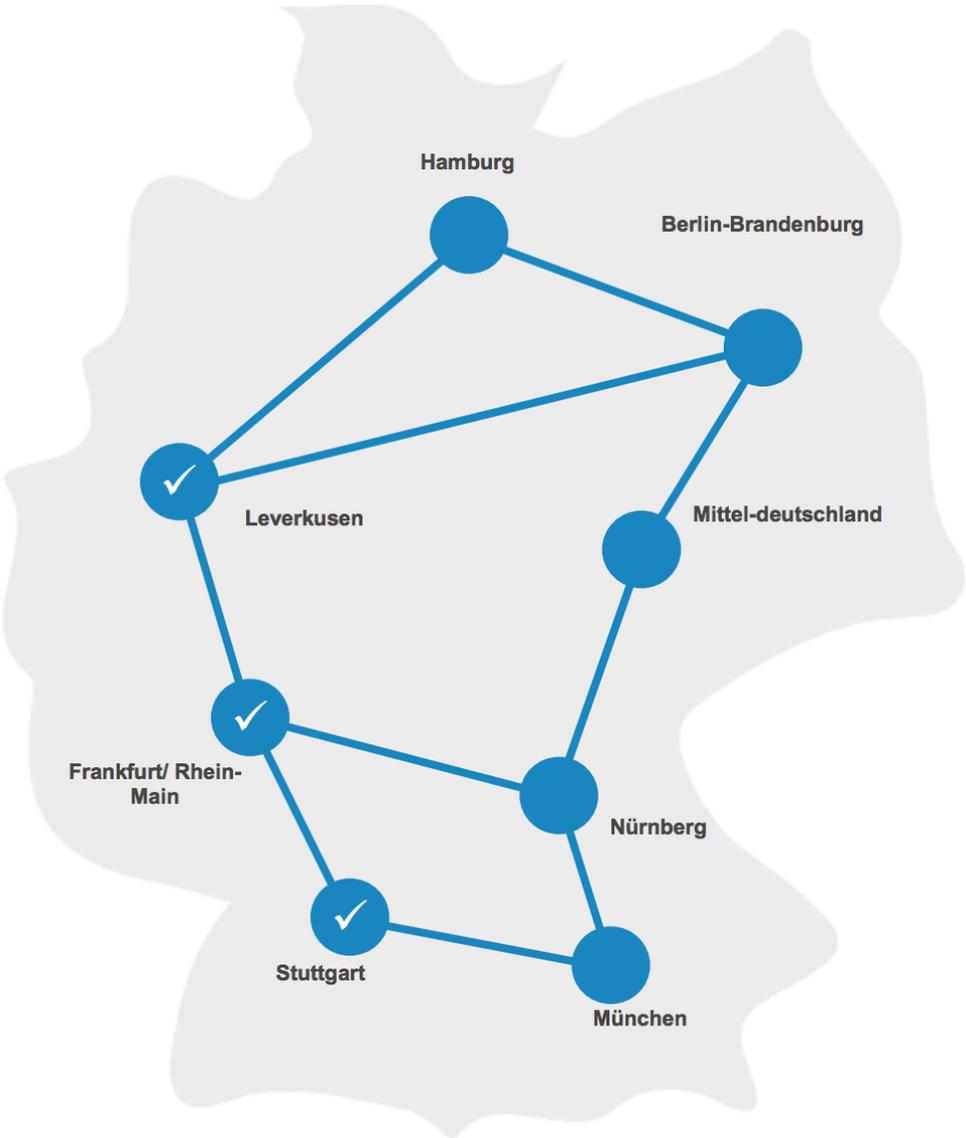
The RND sent me the same document which I sent to you [yesterday](#). So I think the risks and challenges have been described clearly in this document.

I checked the OHV's alien wavelength solution with RND. We think they didn't resolve the issue about monitoring actually, they just supplied some visible path in the NMS.

In my opinion, the market share of the OHV is very small, interconnecting with other vendors in most network is unavoidable for them. So they declare to support alien wavelength to break through the market.

About the license, I confirmed with RND, there is no new function or convenience after you purchase the license. So I suggest don't purchase the license and stop alien wavelength.

# Motivation - Signal

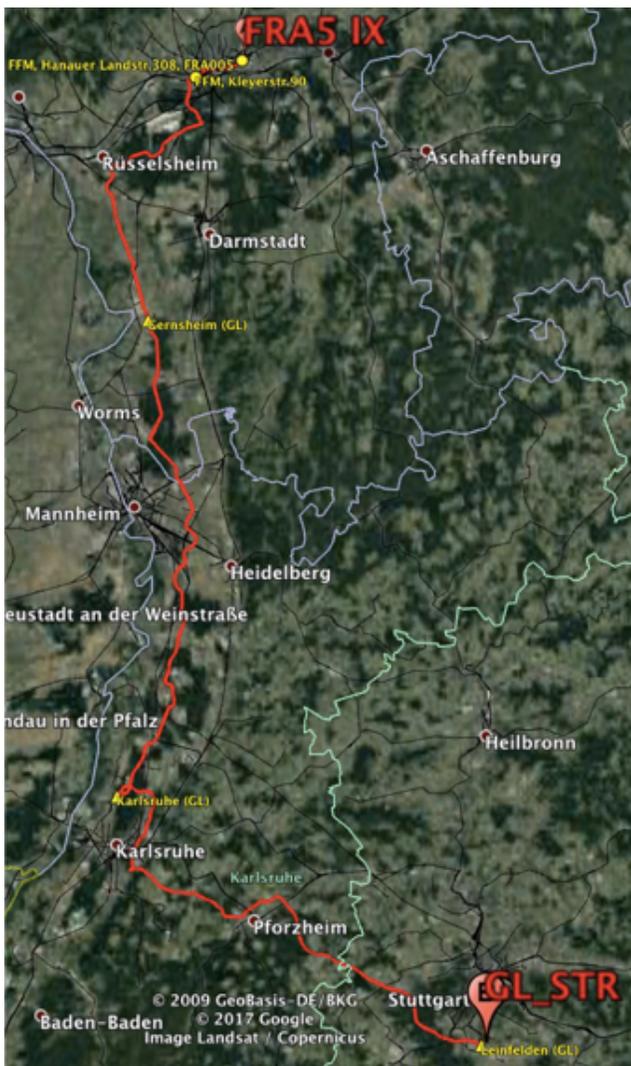


# Motivation

- Globalways is building and operating DCs all over Germany
- Customers demand 10/100Gbit/s Layer1 DCI
- Operating a dedicated fiber backbone is expensive and not our core-business
- 1x100G Service is cheaper than 10x10G Services
  - Therefore it would only make sense to buy 1x100G and a TD-Multiplexer
  - This would just add costs and add to the complexity

# Proof of Concept

# The Network

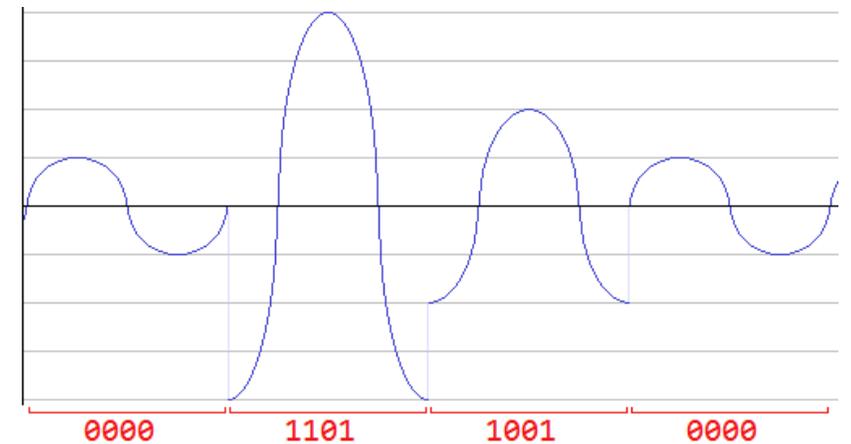
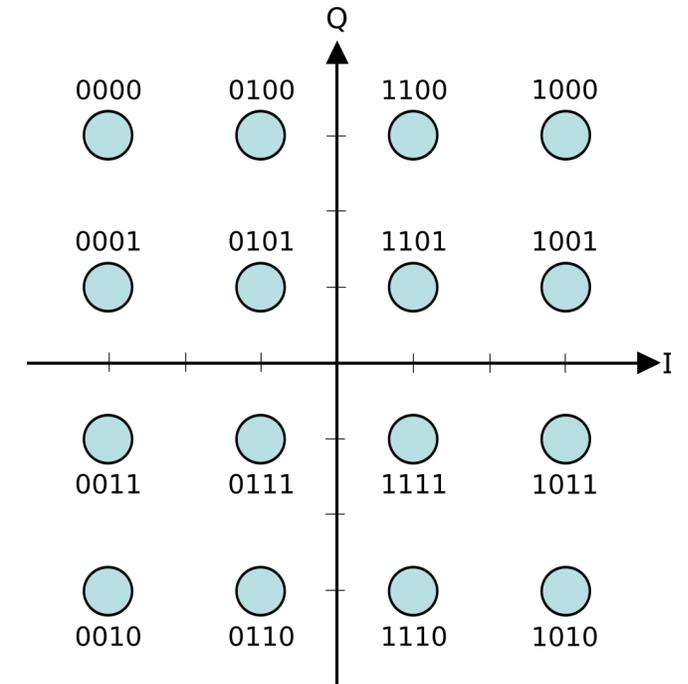
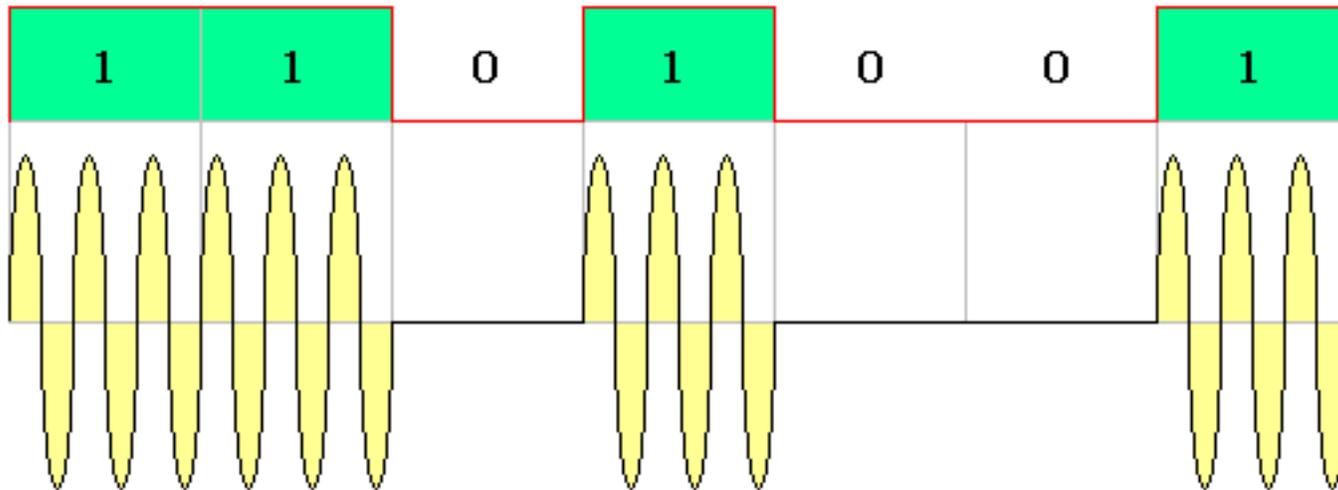


- 280km
- RTD: 3.17ms (incl. DCM)
- OSNR FRA: 20.8dB
- OSNR STR: 21.0dB
- Path:
  - Leinfelden (ROADM)
  - Karlsruhe (FOADM)
  - Gernsheim (FOADM)
  - Frankfurt Kleyerstr. (ROADM)
  - Frankfurt Hanauer Landstr. (ROADM)
- Local Loop to Globalways

# The Signal

- 200GBit/s OTU4C-2
- QAM16 -> max. OSNR ~20dB
  
- ADVA CloudConnect with QuadFlex Linecard
- ECI Appollon with TM400-EN Linecard
  
- PreAmps and Boosters to account for local Loops

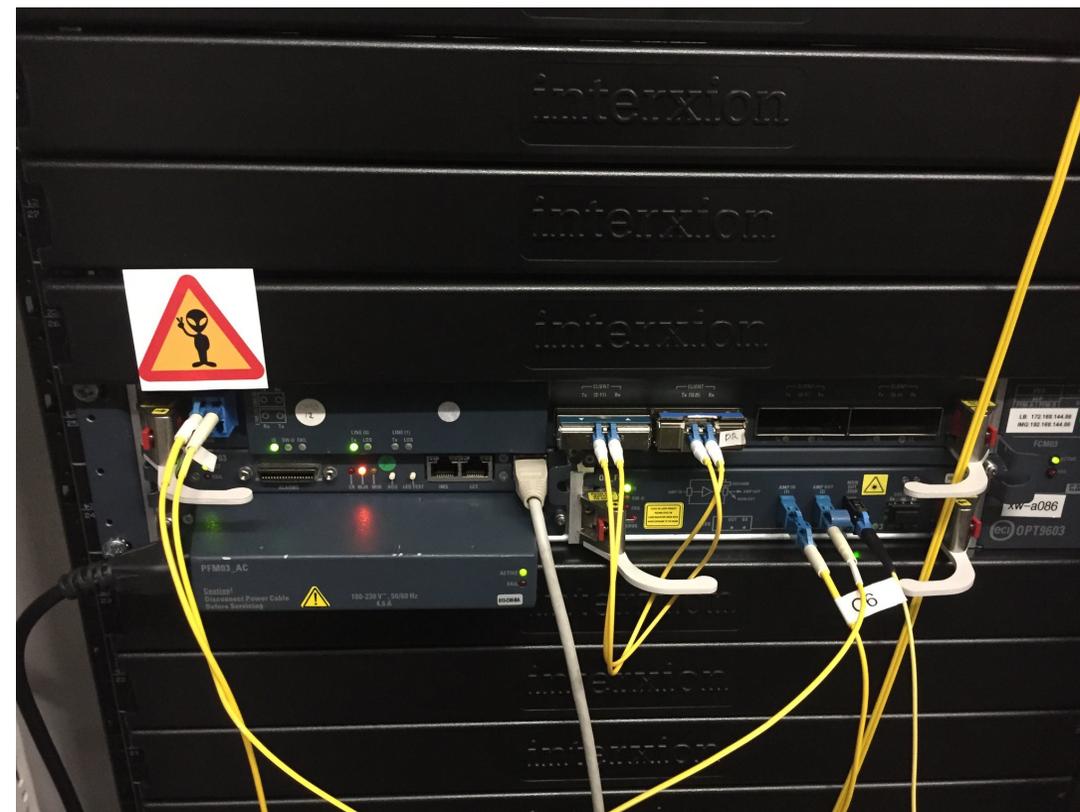
# 10G NRZ vs 200G at QAM16



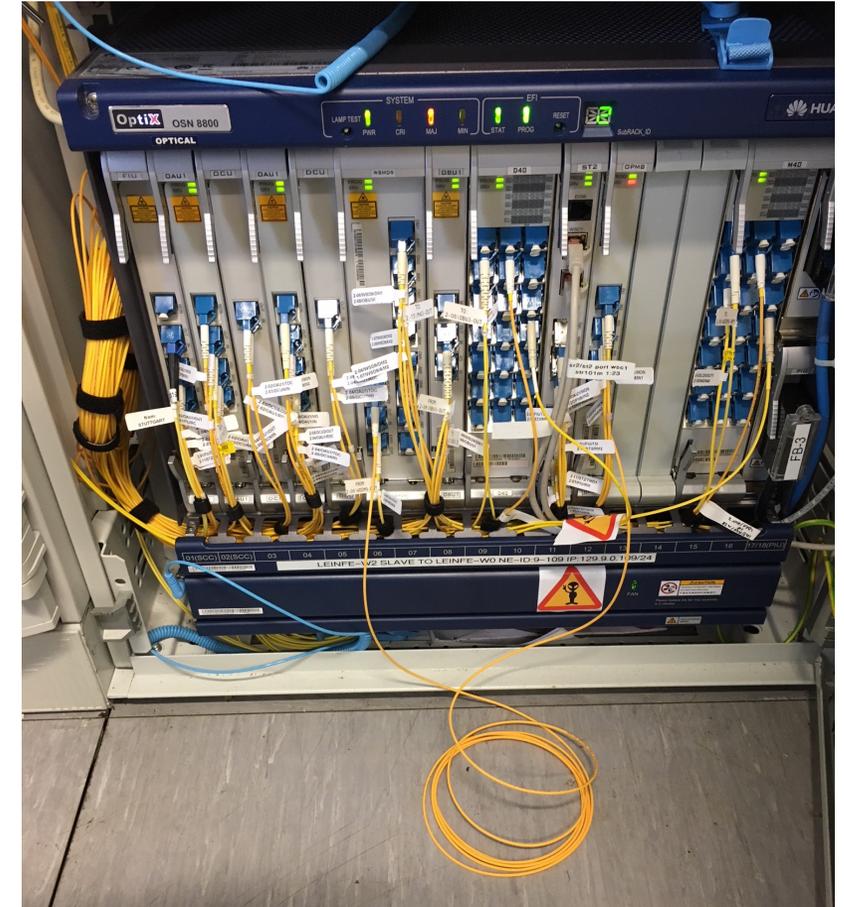
# POC with ECI



**Globalways AG** GasLINE



# POC with ADVA





# Results

- First Tests with ECI only had a Booster and no PreAmp
  - 200G Link came up, but wasn't stable due to uncorrectable bit-errors
  - 100G with DQPSK did work reliably
  - We will come back for 200G
- We took our findings from the ECI POC and applied them to ADVA
  - And were greeted with a stable link

We even did some science!

Hochschule Düsseldorf  
University of Applied Sciences

**HSD**

Fachbereich Elektro- und Informationstechnik  
Faculty of Electrical Engineering and Information Technology



## Analyse der planerischen, kommerziellen und betrieblichen Aspekte der Alien Wavelength

Vorgelegt durch:	David Martin-Perez
Studiengang:	Kommunikations- und Informationstechnik
Erstprüfer:	Prof. Dr. phil. Dr.-Ing. Jürgen H. Franz
Zweitprüfer:	Dipl.-Ing. (FH) Michael Groß

Analyzing the planning, commercial and operational aspects of an alien wavelength  
Bachelor Thesis of David Martin-Perez in cooperation with GasLINE

So is this something new?

NO

< Press releases

# Telefónica Germany Uses ADVA FSP 3000 CloudConnect™ in 200G Joint Trial

## ADVA Optical Networking's OpenFabric™ Technology Creates Simple, Flexible Optical Cross-Connect in Live Disaggregated Network

27 September 2017

ADVA Optical Networking announced today that it has joined the Science-Based Targets initiative (SBTi). As part of the SBTi, the telecommunications technology supplier has committed to set goals for reducing its carbon emissions based on climate science. These science-based targets will align with internationally agreed efforts to keep global warming below the dangerous 2°C threshold. ADVA Optical Networking has two years to set its targets, which will be closely reviewed and validated by SBTi experts. Meeting the targets will officially demonstrate its continuing commitment to sustainability and corporate social responsibility. The company is one of the first 200 organizations worldwide to join the global initiative.

<https://www.advaoptical.com/en/newsroom/press-releases/2017/20170928-telefonica-germany-uses-adva-fsp-3000-cloudconnect-in-200g-joint-trial>

<https://www.sunet.se/blogg/new-toys-200g-dwdm-in-juniper-qfx10000/>

## NEW TOYS – 200G DWDM IN JUNIPER QFX10000



av Fredrik "Hugge" Korsbäck den 16 Aug 2017

### VOODOO IN SUNETC



FREDRIK "HUGGE"  
KORSBÄCK

Network architect and  
chaosmonkey for AS1653 and  
AS2603. Fluent in BGP  
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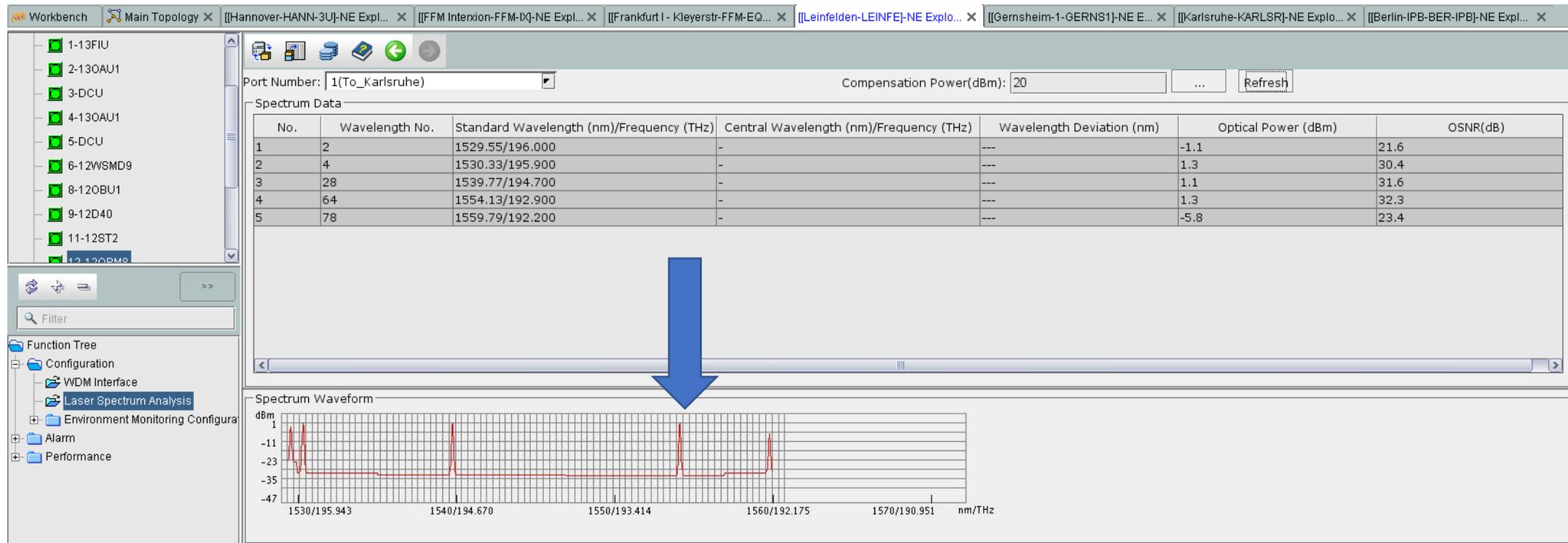
# SLA

- The interesting part is that the network is alien to the customer and the signal is alien to the vendor
- In order to operate an Alien Wavelength customer and vendor need to agree on a SLA describing the DWDM
- This should at least include:
  - Maximum OSNR
  - Maximum RX-Power at the Network
  - Minimum TX-Power from the Network
  - Restoration time on **both** sides

# Extract from service description

- The passive transfer unit provided by GasLINE is equipped as standard with an interface as per the wavelength according to ITU-T G 694.1 and a connector type (LC/PC) to be agreed with the customer. A transfer is only possible as single mode.
- To implement an OptiNET Connect Alien Wave connection, GasLINE will specify the parameters for :
  - wavelength,
  - channel spacing / channel bandwidth, and
  - transmission level.
- The parameters will be communicated by GasLINE during the planning phase and agreed with the customer in the technical data sheet. The customer will ensure that the agreed parameters are met.

# At least, we have a chance to permanently monitor the entire spectrum



# Special Thanks

ADVA – Andreas Reinert, Oliver Otto, Oliver Zellin

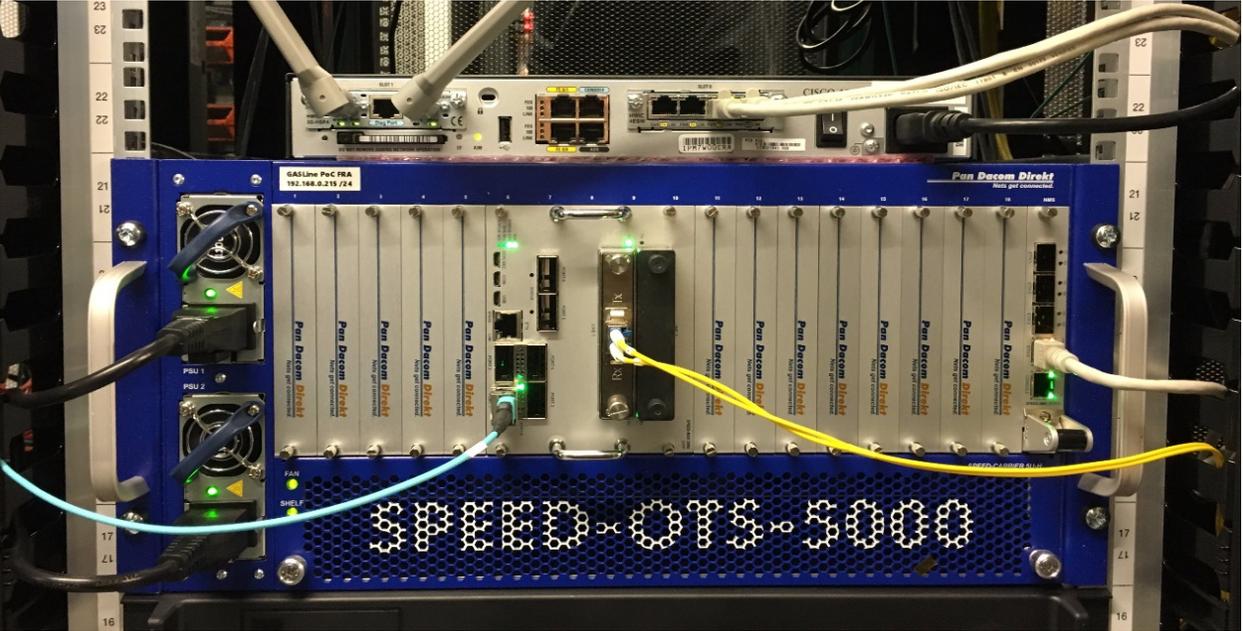
ECI – Ulrich Hildebrand, Rüdiger Zander

Our Teams – Michael(GL), Lars(GL) and Joachim(GW)

# Next steps

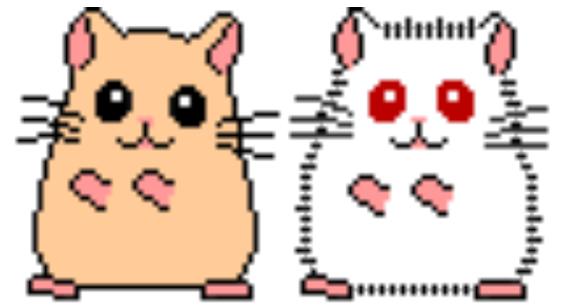
- Another running POC in progress with Pan Dacom Direct between Frankfurt and Munich (OTU4 without 3R, eQPSK), results to be reported on request
- Developing an power-limiter either as an eVOA or a preinstalled amplifier with power-locking

• 34C3



Test environment										
OTU1	OAU1						OAU2			OTU2
NE version	V100R009C10SPC500									
U2000 version	R16C60SPC200									
Unit:db	Gain of 1st OAU	24	23	22	20	18	16	14	13,5	15
	attenuation of 1st OAU	2	2	2	2	2	2	2	2	12
	lock the outpower of 2nd OAU	4	4	4	4	4	4	4	4	4
	attenuation of 2nd OAU	1	1	1	1	1	1	1	1	10
	OSNR of OTU1(35-90)	>45	>45	>45	>45	>45	>45	>45	>45	>45
	OSNR of OAU1(35-90)	41,2	41	41	40,4	40,1	39,2	39,2	39,2	29
	OSNR of OAU2(35-93)	40,9	40,7	40,7	39,8	39,2	38,1	37,5	37,5	27,8
	OSNR of OTU2(35-93)	40,9	40,7	40,7	39,8	39,2	38,1	37,5	37,5	27,8
	inpower of port1 of OAU2(35-93)	0,3	-0,7	-1,7	-3,7	-5,5	-7,5	-9,4	-9,8	-15,3
	outpower of port4 of OAU2(35-93)	4	4	3,9	4	4	3,9	3,8	3,9	4
	inpower of port1 of OTU2(35-93)	-7,9	-7,9	-8	-8	-8	-8,2	-8,1	-8,2	-9,9

Questions?



Thank You!

Backup Slides

# Security Considerations

**Tom Eichhorn**

12 May 2017 at 09:54

To: Marc Helmus, [denog@lists.denog.de](mailto:denog@lists.denog.de)

Re: Alien Wave aka Black Link ITU698.2



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Das macht doch kein ernst zu nehmender Carrier, wenn er ein stabiles Netz haben will...

Gruß,  
Tom

No serious carrier would provide this service if he's aiming for a stable network