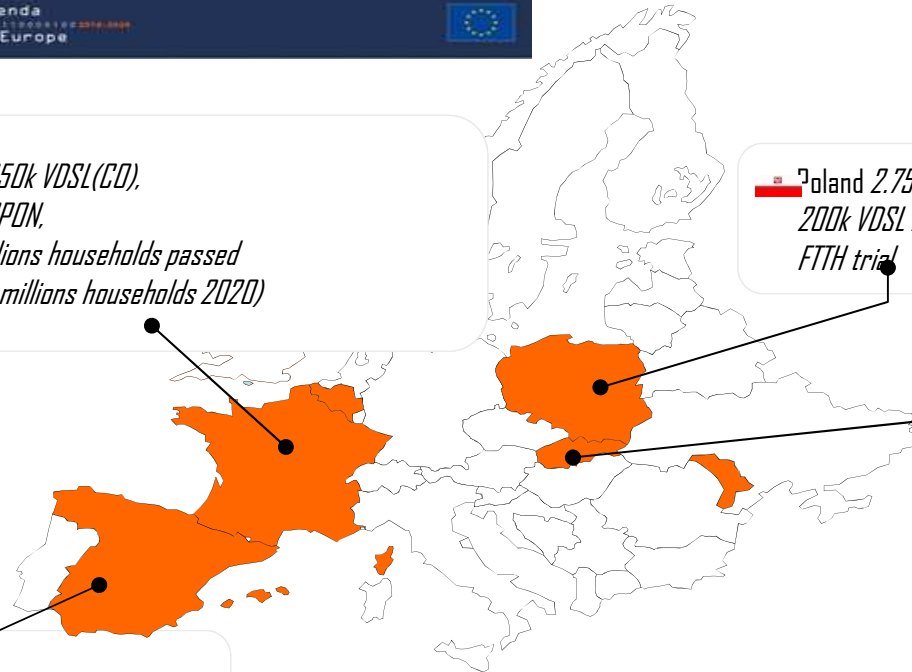


FTTdp & G.fast across Orange Networks


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Orange Labs
UFBB 2015, June 17th




Orange deploying VHBB in Europe



France  *11.1M ADSL, 350k VDSL(CO),
560k GPON,
3.6 millions households passed
(-> 15 millions households 2020)*

Poland  *2.75 M ADSL
200k VDSL 2
FTTH trial*

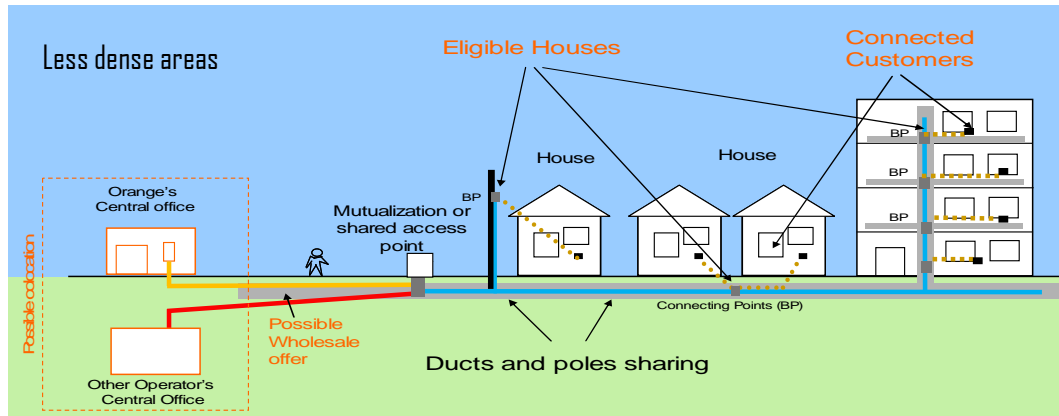
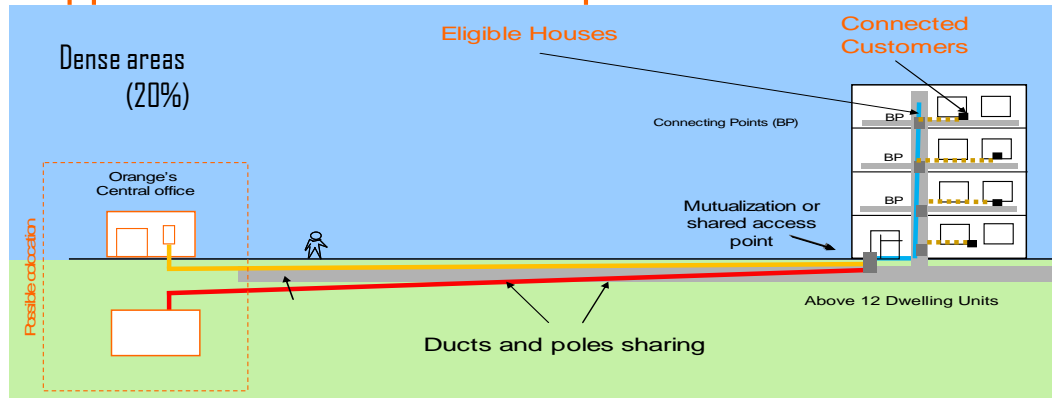
Slovakia  *97k
GPON*

Spain  *1.8 M DSL,
50k GPON Fiber deployment*

 *16M DSL, 700 k GPON*



Orange France fiber roll-out: Typical approaches with a last drop



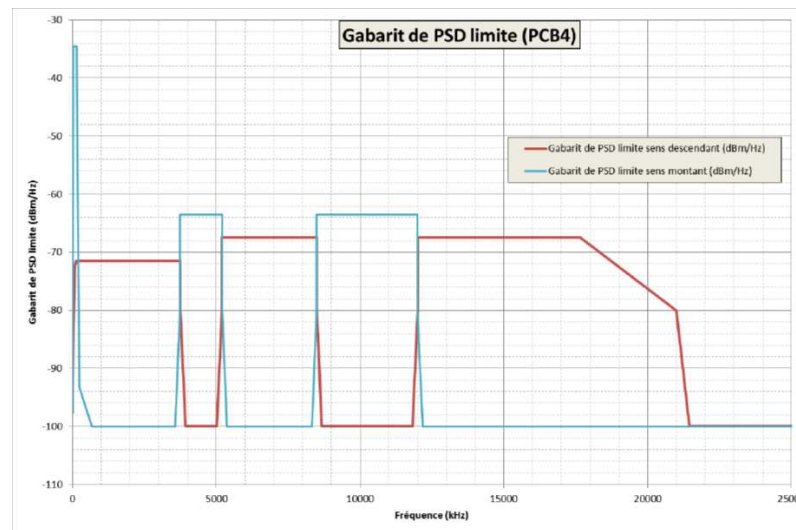
Target : 100% VHBB eligibility in 2022

- ~ 60% Households through direct investment from Private Operators
- ~ 40% Households : Public Initiative Networks



FTTdp Regulation in France

- ARCEP expert committee delivered a favorable opinion to introduce VDSL2 from the distribution point on May 5
 - profile 17a, band plan 998ADE17, USD type A, no UPBO required, PSD masks with PCB



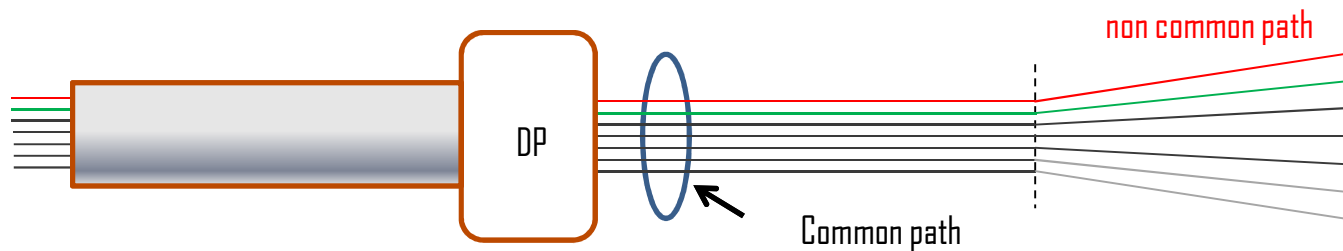
- Only to buildings up to now
- before any large-scale rollout is performed a trial phase under actual conditions should be done

Orange Group G.fast requirements to the industry

- Low cost
- Customer self install
- Single port G.Fast unit : No need for vectoring
- Reverse powering
- FTTH service speeds (up to 1Gbit/s)
- No interference with deployed xDSL
- POTS is not a requirement (for one port solution)
- Multiport solutions may be needed in other Orange countries

French topologies : Drop cables

- In France, from the **network** side a **7 pairs binder cable** is connected to the DP. From the DP to the **customer** site, 7 **dedicated cables** are used. In certain cases, part of the path is common to the cables, before a split to the different houses
- Three main **drop topologies** were studied : Building, Underground and Aerial case.
- In each case, a certain **common path length** is defined as well as a non common path. In the non common path, the cables are separated by at least 1 m.



Drop cables French topologies (worst realistic cases)



- Building case:

- 0.5 mm cable (278 French type), 6 m in common (where the cable are tied on every 40 cm, no space) and 19 m without common path



- Underground case:

- 0.6 mm cable (92 French type), 50 m in 100mm diameter common duct and 40 m without common path



- Aerial case

- 0.74 mm cable (5/9 French type), 75 m in common with 15 cm between each cable and 75 m without common path

“The test hall in Lannion” :
Orange testing close to real situations

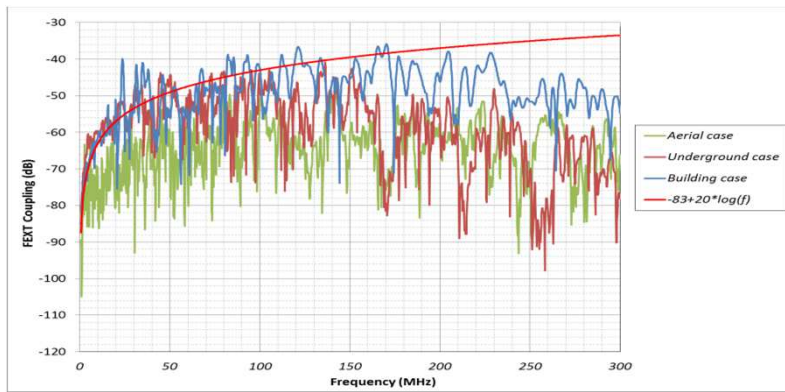


Crosstalk measurements

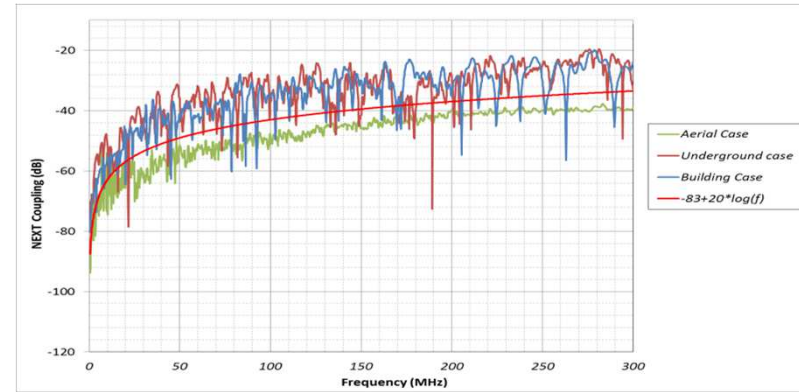
- Initial measurements (up to 30 MHz) show that the crosstalk between the cables originating from the DP is close to:



- As one port solution is the current requested solution, it is important to characterize the level of NEXT and FEXT. NEXT and FEXT were measured up to 300 MHz



FEXT

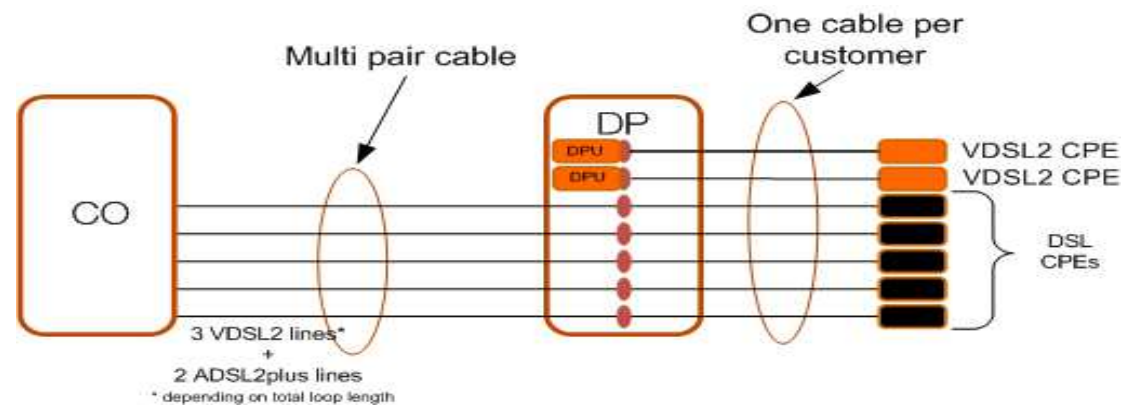


NEXT

- NEXT and FEXT effect on G.fast performances and impact for the single port case needs to be evaluated

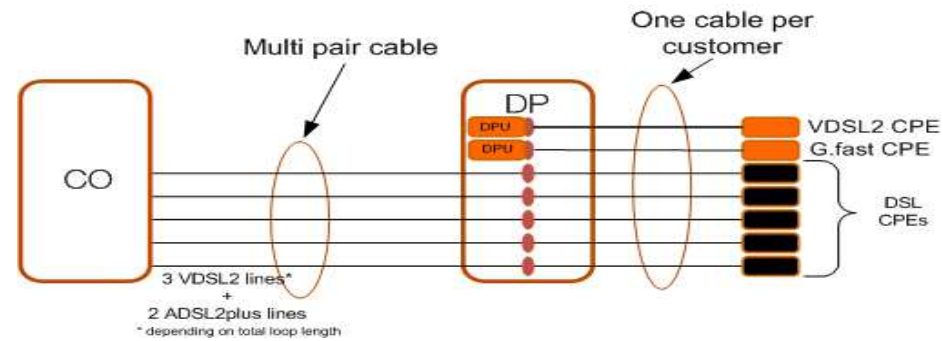
Test protocol: Reference situation

- In order to determine the performances of G.fast and the impact of G.fast on VDSL2 and vice-versa, a test protocol has been defined
- Initially, it is considered that there are 5 disturbers among the 7 pairs used: 3 ADSL2plus and 2 VDSL2 17a and also consider two VDSL2 17 a lines deployed from the DP.

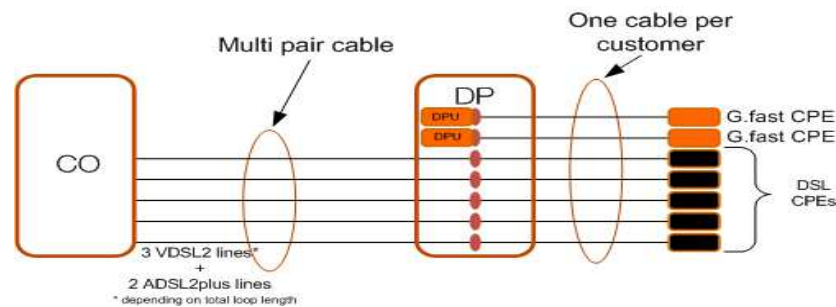


Test protocol: G.fast impact on VDSL2 and G.fast performance

- A VDSL2 line from the DP is migrated to G.fast to determine the impact of G.fast on VDSL2



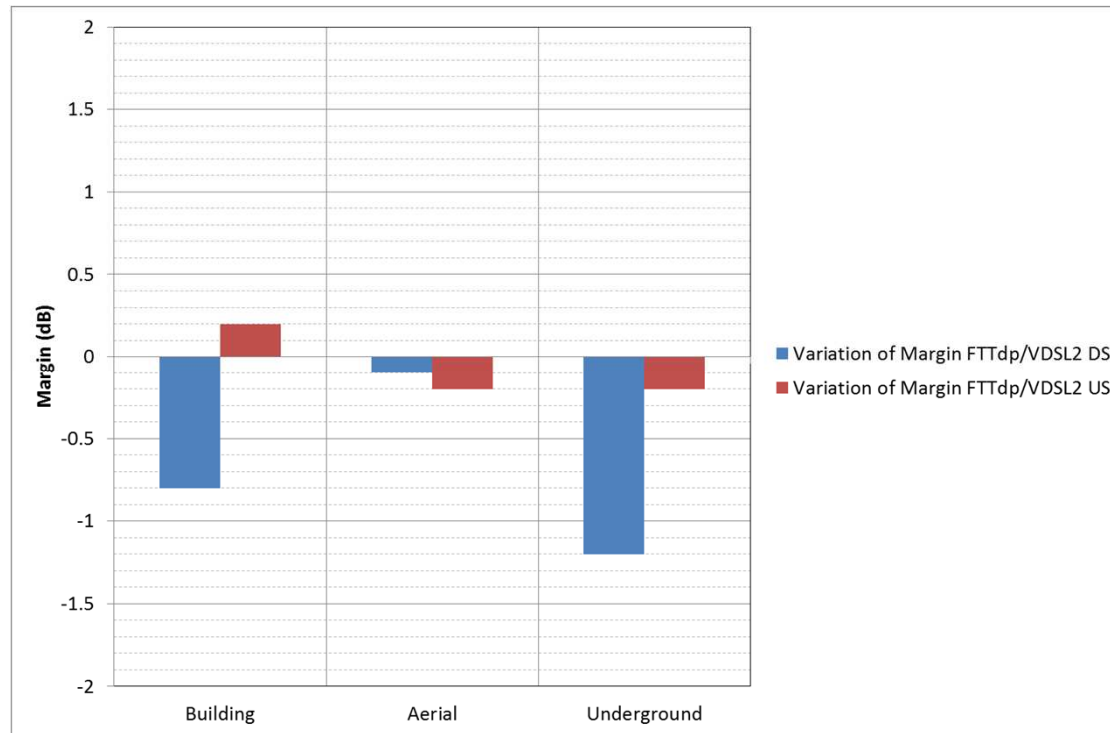
- The second VDSL2 line from the DP is migrated to G.fast. When synchronised the first G.fast line is resync to obtain G.fast performance



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G.fast impact on FTTdp/VDSL2

- G.fast and FTTdp/VDSL2 use the same PSD below 17 MHz

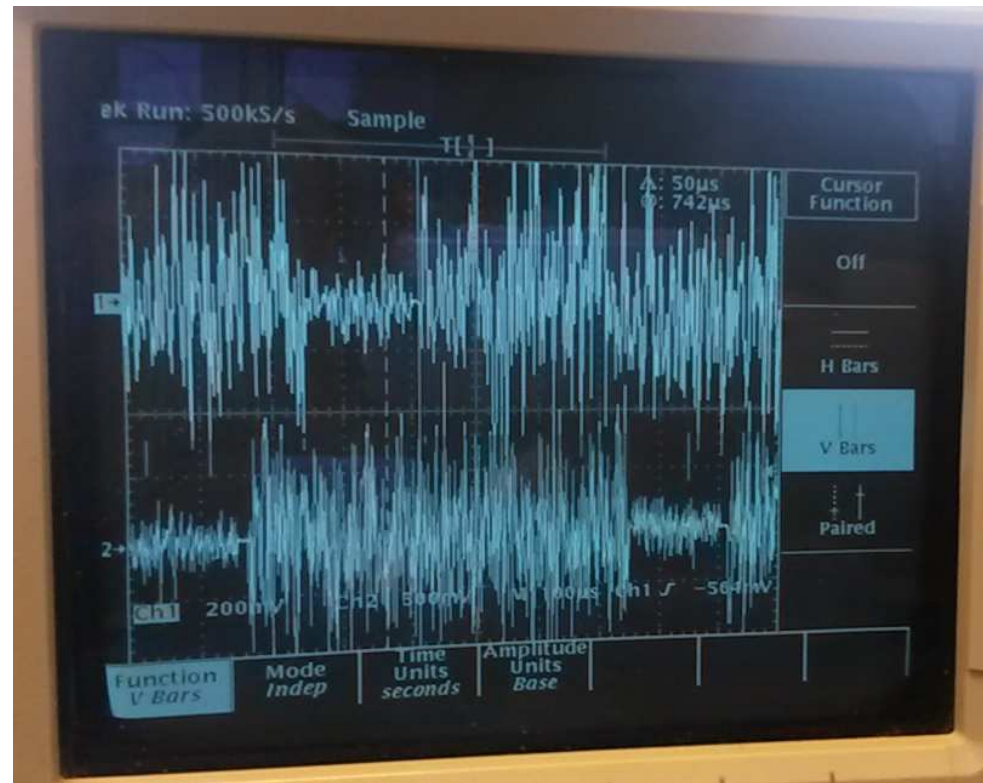


- Impact less than 1 dB except in the underground case

G.fast self impact

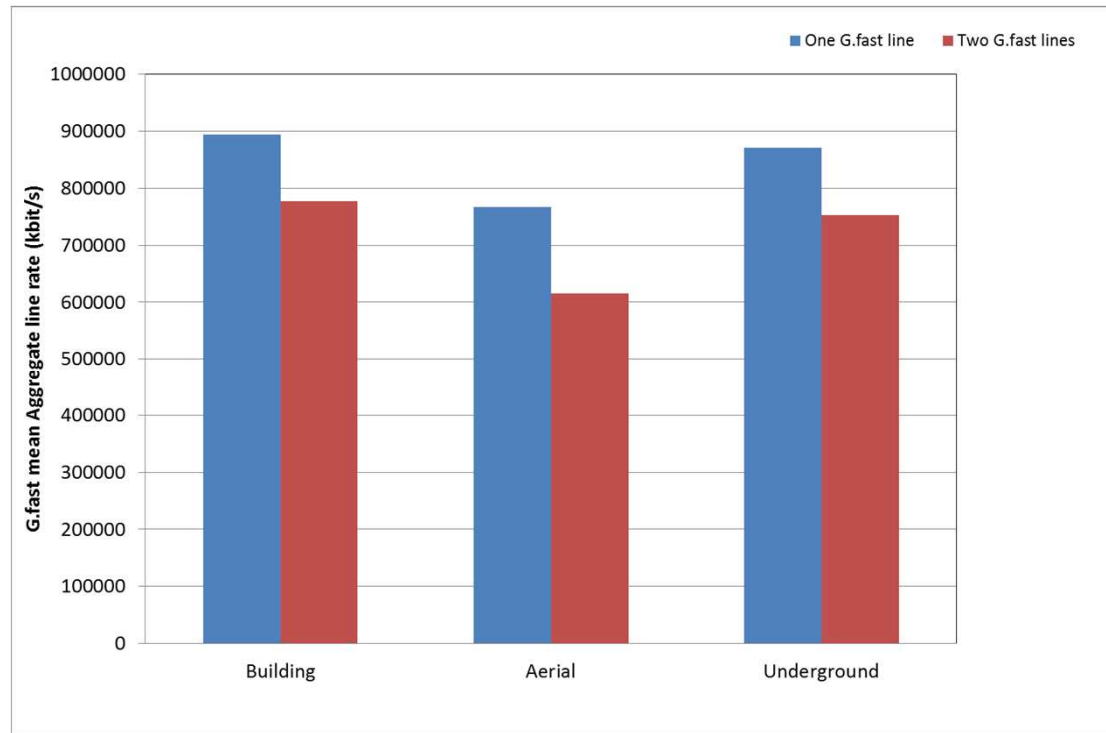
- Using two G.fast connected to two different DPUs
- Both lines used the same DS/US split ratio

G.fast self impact: Two G.fast lines from two different DPU's



G.fast self impact

- Using two G.fast connected to two different DPUs
- Both lines used the same DS/US split ratio



- In all the cases the mean aggregate rate is greater than 600 Mbit/s

Conclusions



Conclusions

- The target technology to offer VHBB (Very High Bandwidth) is FTTH
- Orange Labs as Orange's innovation department evaluates G.fast prototypes in order to assess the potentialities of this technology in Orange Networks
- First evaluations show that the one port model is suitable for Orange requirements
- Same evaluations will be done for other Orange's networks (Poland, ..)
- Evaluations will continue to dig deeper the potentialities and constraints linked to G.fast use

Thank you!

Merci !

Dziękuję !

Gracias !

Dieuredieuf

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Xièxie

धन्यवाद

