Efficient Architectures for VDSL

ClearSpeed Technology Ltd

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- **Introduction to ClearSpeed**
- **Next generation broadband**
- **Processing architectures**
- **Conclusions of investigation**
- **Next steps**

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Introduction to ClearSpeed

- **ClearSpeed Technology formed in 2002**
- **Architecturally Low power / High Performance**
- **Highest efficiency processor technology**
  - Supported by SDK, libraries and applications
- **Ultra-high performance processing to enhance DSP / Embedded Solutions**
  - Automotive, Mil/Aero, Pro-Audio, Image Processing
- **Circa 100 patents applied for or granted on the technology**

- **Available as an IC in BGA package**

or

- **Licensable IP**
  - Processor cores
  - High bandwidth interconnect fabric
  - Network on chip
  - Fully Scalable

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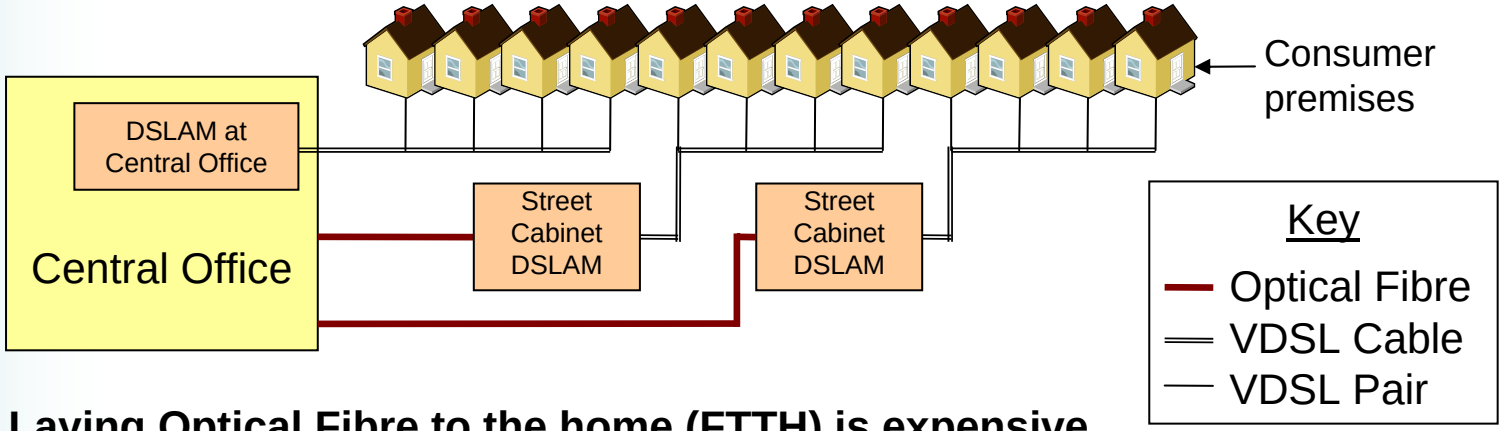
Next generation broadband

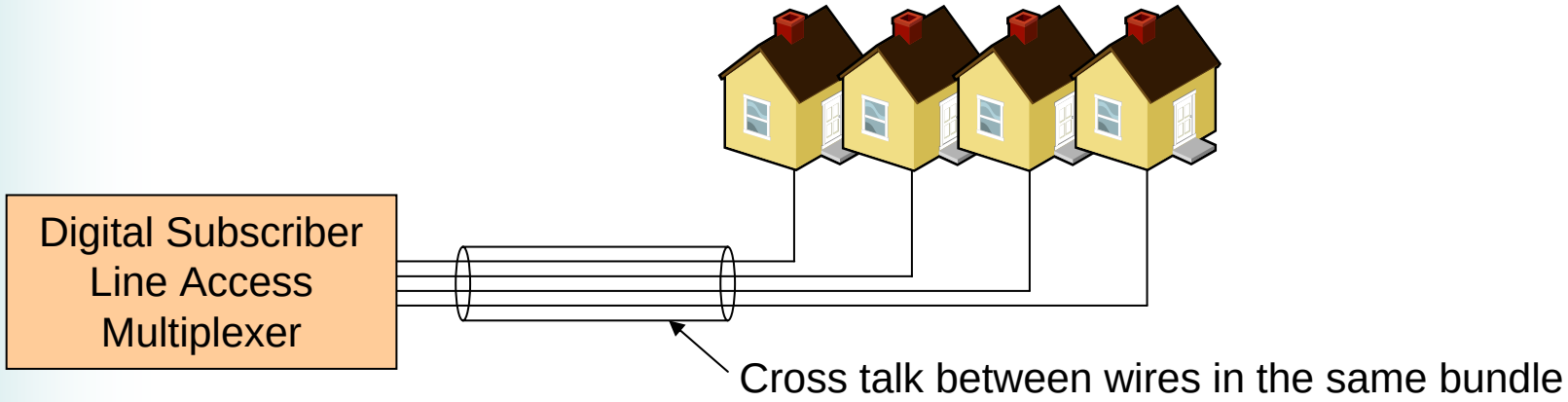


- **Laying Optical Fibre to the home (FTTH) is expensive**
- **Laying Optical Fibre to the street cabinet (FTTC) and using VDSL over the existing copper wire is cheaper and supports up to 200 Mbit/s**

	60%	90%	100%
FTTC	£450	£1,000	£1,700
FTTH	£2,000	£5,000	£10,000

Cost per premises connected for 60% to 100% of premises (Digital Britain report June 2009)

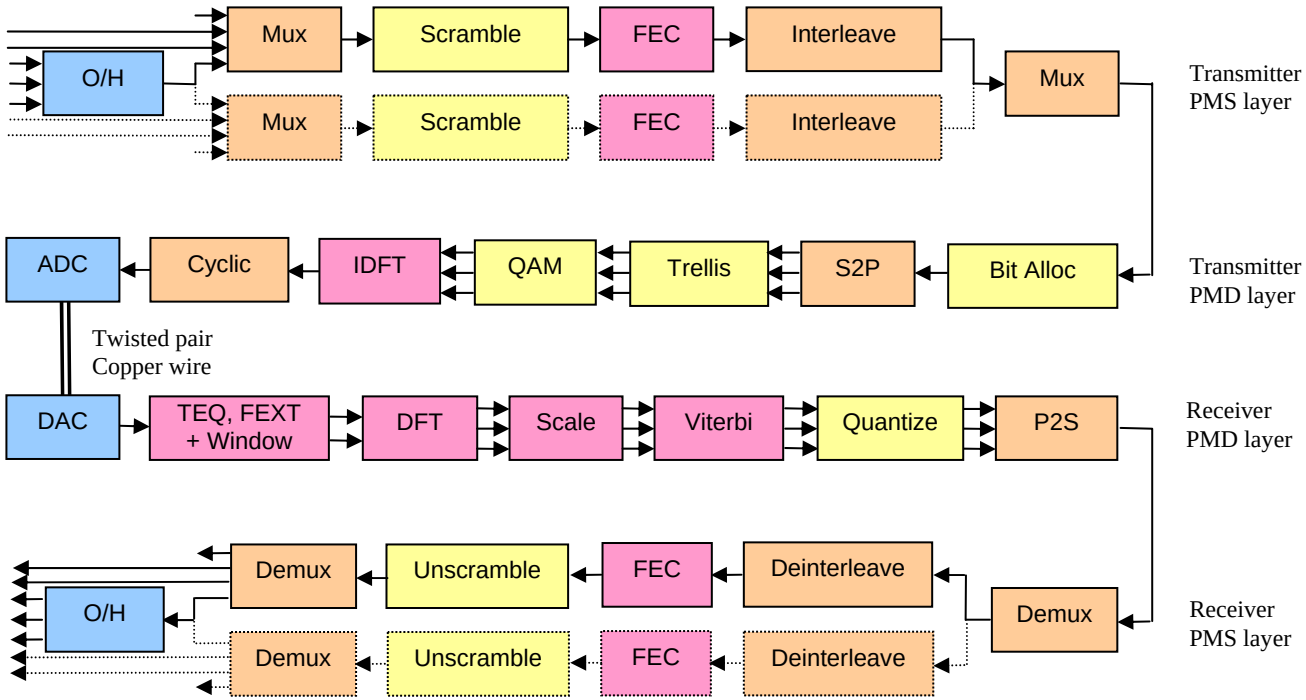
Next generation broadband



- **VDSL bandwidth is limited by interference from cross talk**
- **The transceiver at the DSLAM can compensate for this**
- **DSLAMs installed in street cabinets for VDSL should be:**
  - **Low power, but with spare processing capacity**
  - **Software programmable or reconfigurable**

Processing architectures

Configurable Pipeline VDSL transceiver

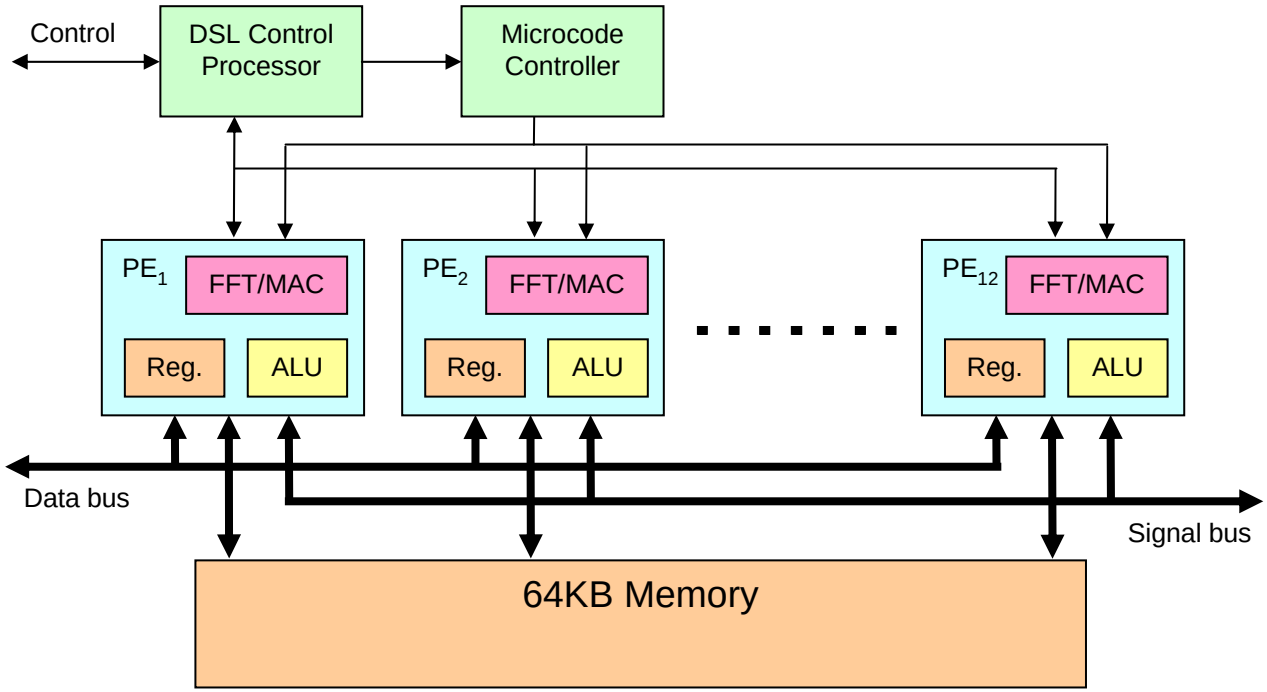


- **Silicon Area per channel : 1.66 sq mm**
- **Power Consumption : 85mw**

(excluding analog circuitry)

Processing architectures

SIMD array VDSL transceiver



- **Silicon Area per channel : 1.04 sq mm**
- **Power Consumption : 64mw**

(excluding analog circuitry)

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Conclusions of investigation

	Advantages	Disadvantages
Pipeline	• Simple architecture • Cheaper to develop • Easy to verify	• Higher power consumption • Lack of flexibility • Redesign necessary to upgrade • Higher cost part
SIMD	• Low power consumption • Flexible architecture • Software upgradeable • Low cost part	• Complex architecture • Expensive to develop • Harder to verify

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Next steps

- **Build partnerships with potential customers**
  - Supply requirements to guide our development
  - Supply system level knowledge and route to market
- **Define business plan and identify funding route**
- **Develop more accurate models and proof of concept**
- **Develop Silicon IP product**
  - VDSL transceiver suitable for integration within a system
- **Develop software tools and reference software**

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