

# Cultural participation

## A democratic right

fiber  optic valley

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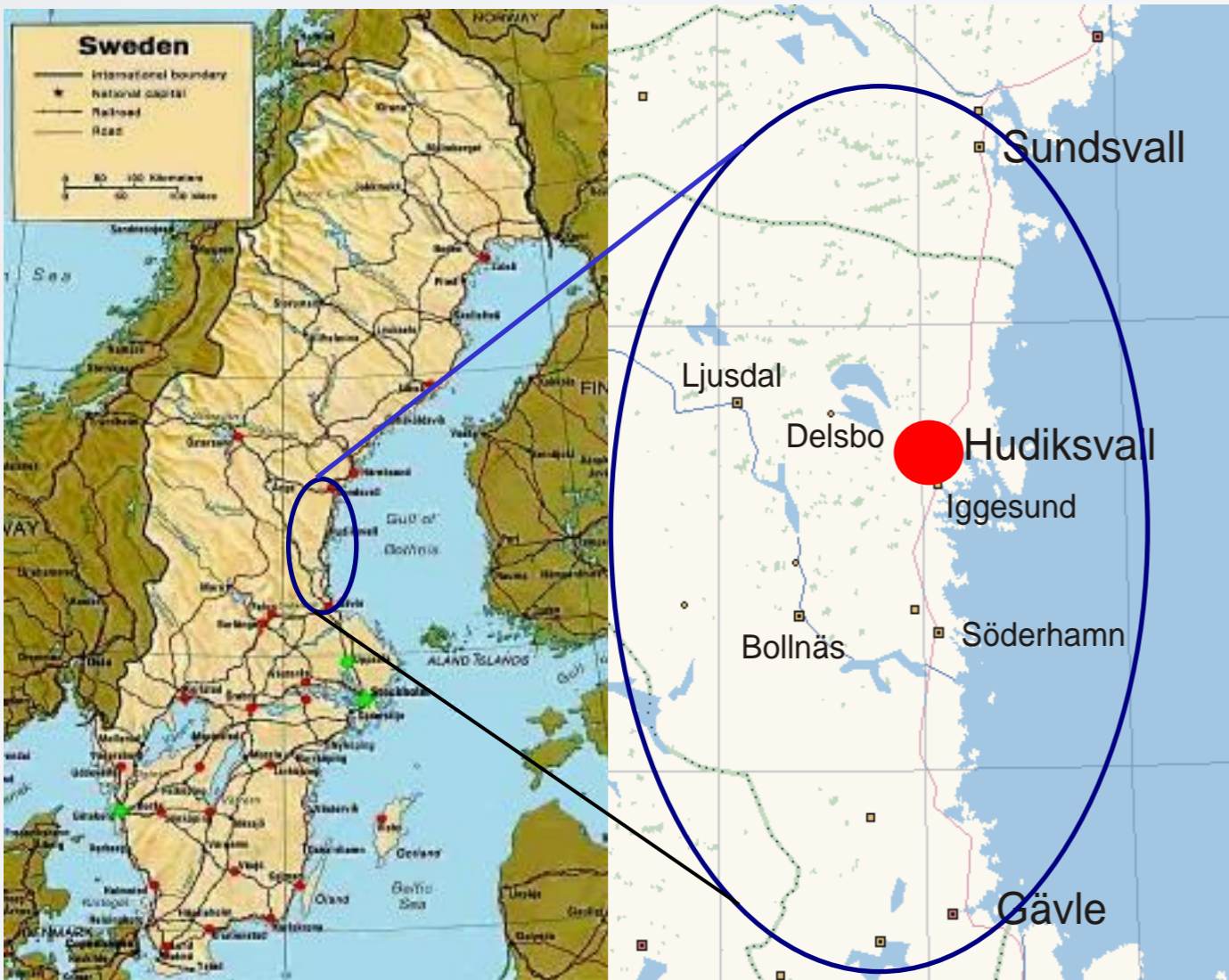
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# Fiber Optic Valley

An Enabler - Connecting Ideas - Creating business



An organisation focusing on **fiber optics** owned by its members established in Mid-Sweden with Hudiksvall as center

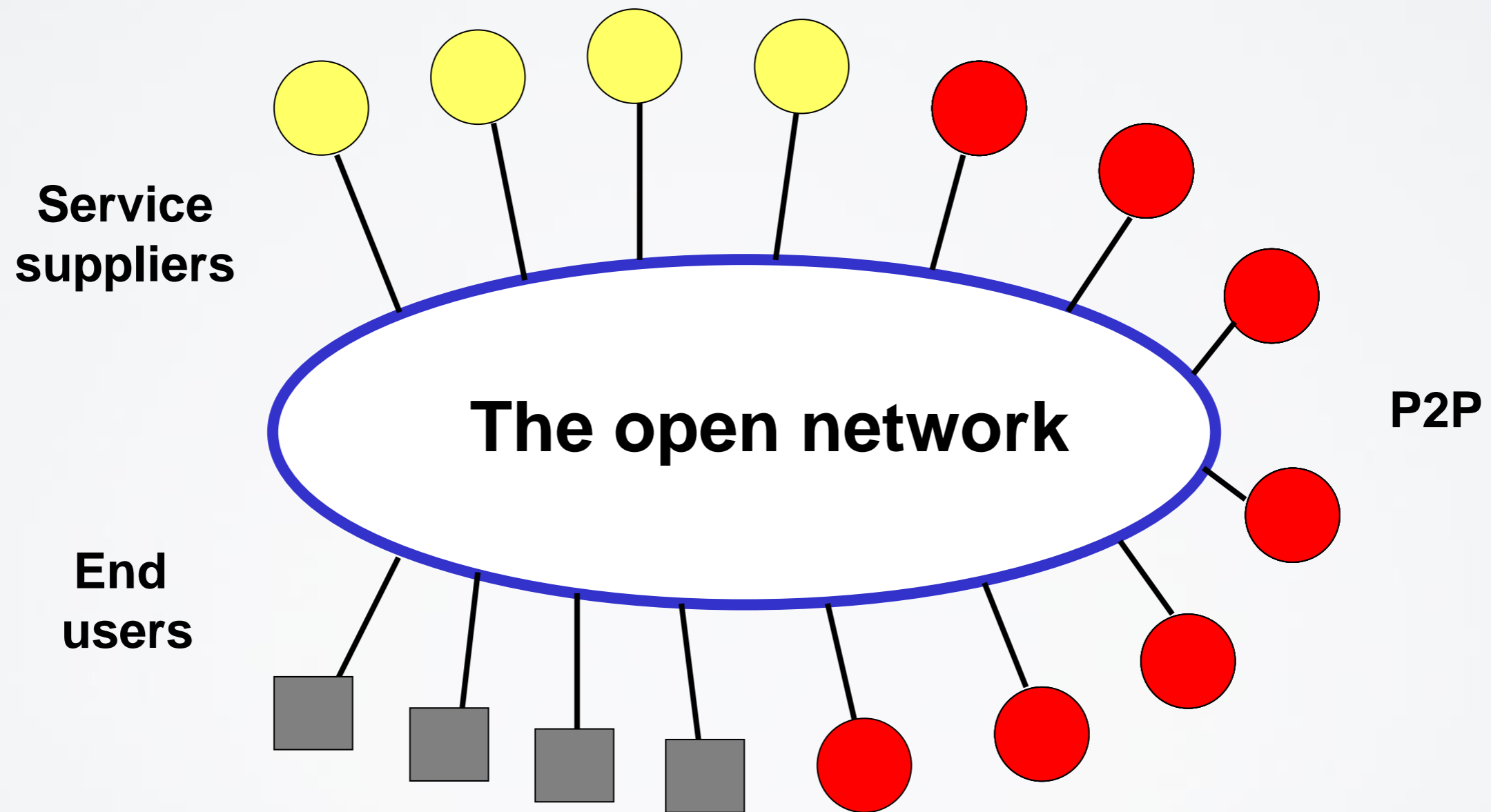
**Our core business** - to support global and local firms with research, training, financing, contacts, product and business development combined with a test environment for technical tests and behavioral science studies

# We have a number of tools for ur customers



# Our desire – the open network

All end users is connected with all service suppliers



# Some cultural applications



# Requirements for remote music interaction

1 - High quality picture and sound

Compressing/decompressing of data takes too much time. This means that the connection between the players should be able to handle 1,5 Gbps (only fiber all the way will do).

2 – Total symmetrical delay of sound and picture probably  $\ll 0,1$  s

As short delays as possible in cameras, mixers, fiber link, projectors and loudspeaker systems.

3 – Synchronisation of picture and sound preferably  $\ll 0,1$  s

The least important requirement.

# Technical challenges due to delays

Expensive end units ( 10k€) should enable  $< 10$  ms total delay

Fiber delay =  $1$  ms/200 km (dedicated fiber channel)

A total of  $< 50$  ms delay (pain threshold when making music together?) corresponds to a distance of  $< 8000$  km

Thus, it should be possible to make music together within a continent at least for educational/rehearsel purposes (to start with)

Conclusion:

Remote teaching is possible if we drop sound/video synchronization and minimize sound latency with today's video conference system SW on 1-100 Mbps Internet + relatively cheap end user equipment (today's cost around 2k€/site)

Playing together with both sound and HD-video synchronized requires a guaranteed **continuous** capacity of 1,5 Gbps + relatively expensive end user equipment (today's price 10 k€/site)

# On a video in a few seconds - A test from the chamber music festival in Hudiksvall in february 2011

