



an innovative and integrated
wireless network
aimed at offering
Triple Play services



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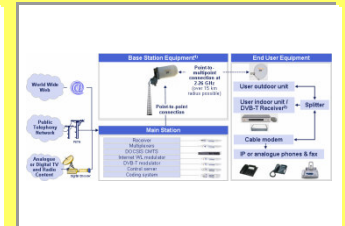
Introduction

AIR is a wireless network that can be used to offer Triple Play economically, i.e. with a typical pay-back time of 18 to 30 months¹⁾

Introduction to the AIR System

What is AIR?

- AIR is a wireless access network that combines global standards so that Voice over IP, broadband connections and digital TV can be offered in an ideal manner. It can operate in the frequency range between 2 GHz to 26 GHz and requires line-of-sight connections
- Each cell can cover an area with a radius of over 15 kilometers, i.e. an area of over 700 square kilometers at an ideal topography



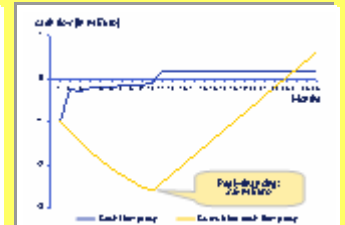
What can be offered via AIR?

- Operators can offer broadband Internet access, digital TV channels and Voice over IP telephony (and fax) services to their customers
- The system can transmit up to 148 TV channels or up to 1.3 Gbps downstream broadband speed if all of a maximum of 300 MHz downlink spectrum is used only for TV or only for broadband transmission²⁾
- The 300 MHz downstream spectrum could e.g. be split to transmit both 612 Mbps downstream broadband speed and 80 digital TV channels³⁾



How good is the business opportunity?

- To roll-out and to operate an AIR system provides good business opportunities
 - network investments are low and ongoing costs are low due to the possibility to maintain and operate the system remotely
 - pay-back can be achieved within 18 to 30 months even in a sample small network with only two base stations if at least 5,000 subscribers at an ARPU of 20 Euro can be achieved



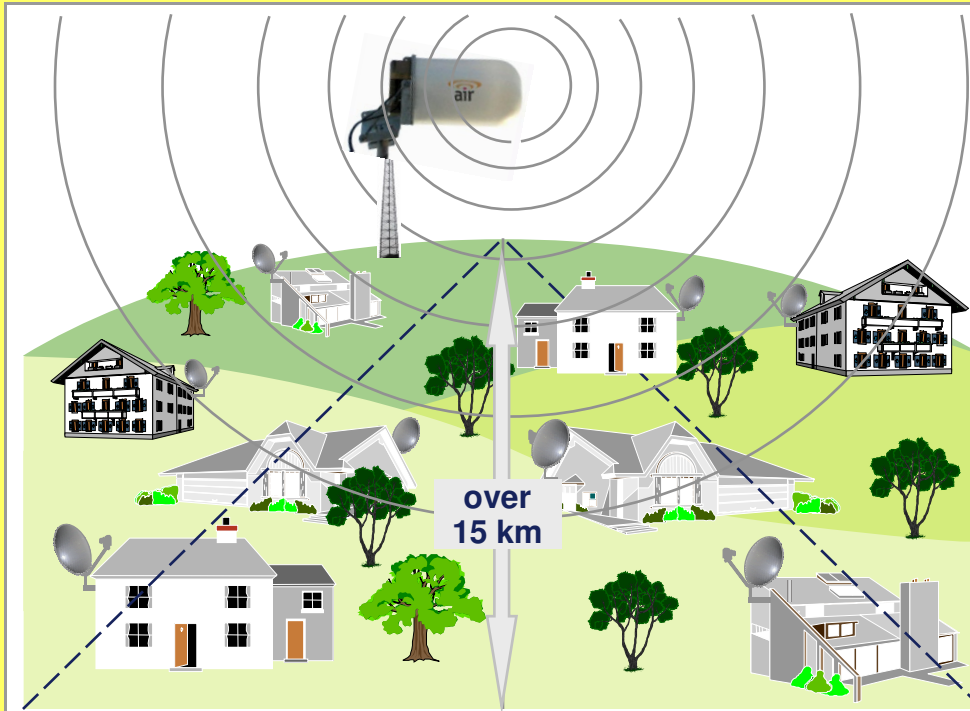
1) 18 months are possible if CPEs are not subsidized 2) The AIR system operates with a spectrum of up to 300 MHz down- and 300 MHz upstream
3) Or another combination of downstream speed and the number of TV channels

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System Introduction – Smart Architecture

AIR is a stationary wireless access solution via which Voice over IP, broadband Internet access and TV services (Triple Play) can be offered

Smart Architecture



 air TEL

- Voice over IP telephony
- Full ISDN features
- Analogue phones and fax machines can be used

 air IP

- Bi-directional broadband Internet access
- E.g. up to 612 Mbps downstream and 368 Mbps uplink speed*

 air TV

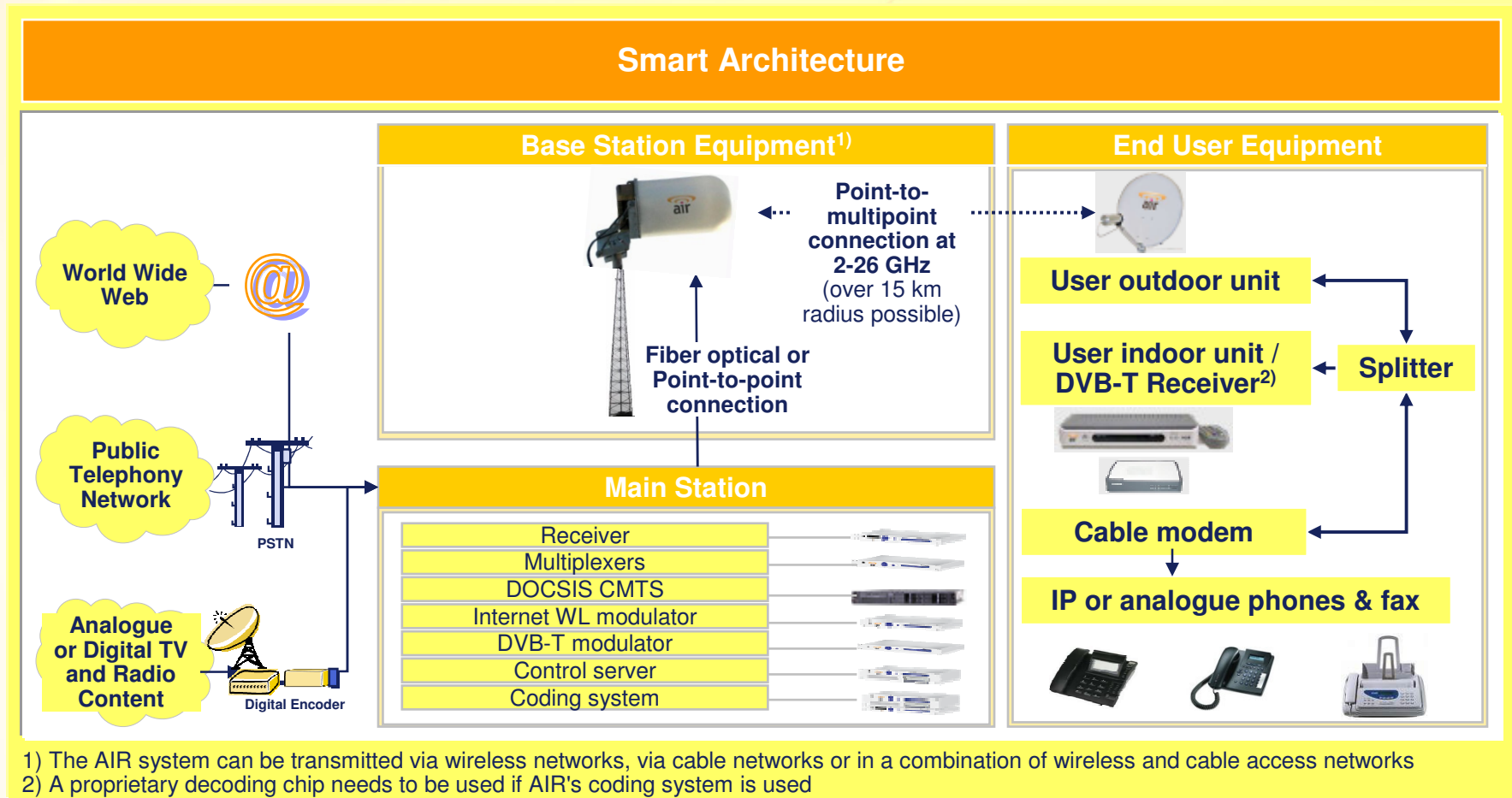
- Broadcasting of e.g. 80 digital TV channels in DVD quality*
- Able to broadcast high-definition TV

*) With 296 MHz downstream spectrum, an AIR operator can e.g. offer 612 Mbps downstream broadband speed and 80 digital TV channels or chose to split up the spectrum differently. With additional 294.4 MHz uplink spectrum, up to 368 Mbps uplink speeds could be offered

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System Introduction – Smart Architecture

The AIR system consists of a main station, of base stations (over 15 kilometer radius) and of standard end-user equipment



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System Introduction – Smart Architecture

Operators can offer full Triple Play bundles, VoIP + broadband bundles or separated service packages to their end users

Smart Architecture

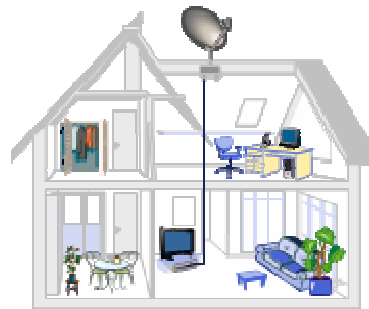
Full Triple Play



Voice and Internet only



TV Only



Triple Play in Multi-Apartment Houses



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System Introduction – Usable Frequencies

AIR can be adapted to operate on any two frequencies (downstream and upstream) in the range of 2 – 26 GHz

Capable to Use a Range of Frequencies

AIR works on any two frequencies in the range 2 – 26 GHz

- AIR uses two frequencies in the range between 2 – 26 GHz
- The AIR system can operate on up to 300 MHz spectrum in the downstream and up to 300 MHz spectrum in the upstream frequency

Tested frequency ranges

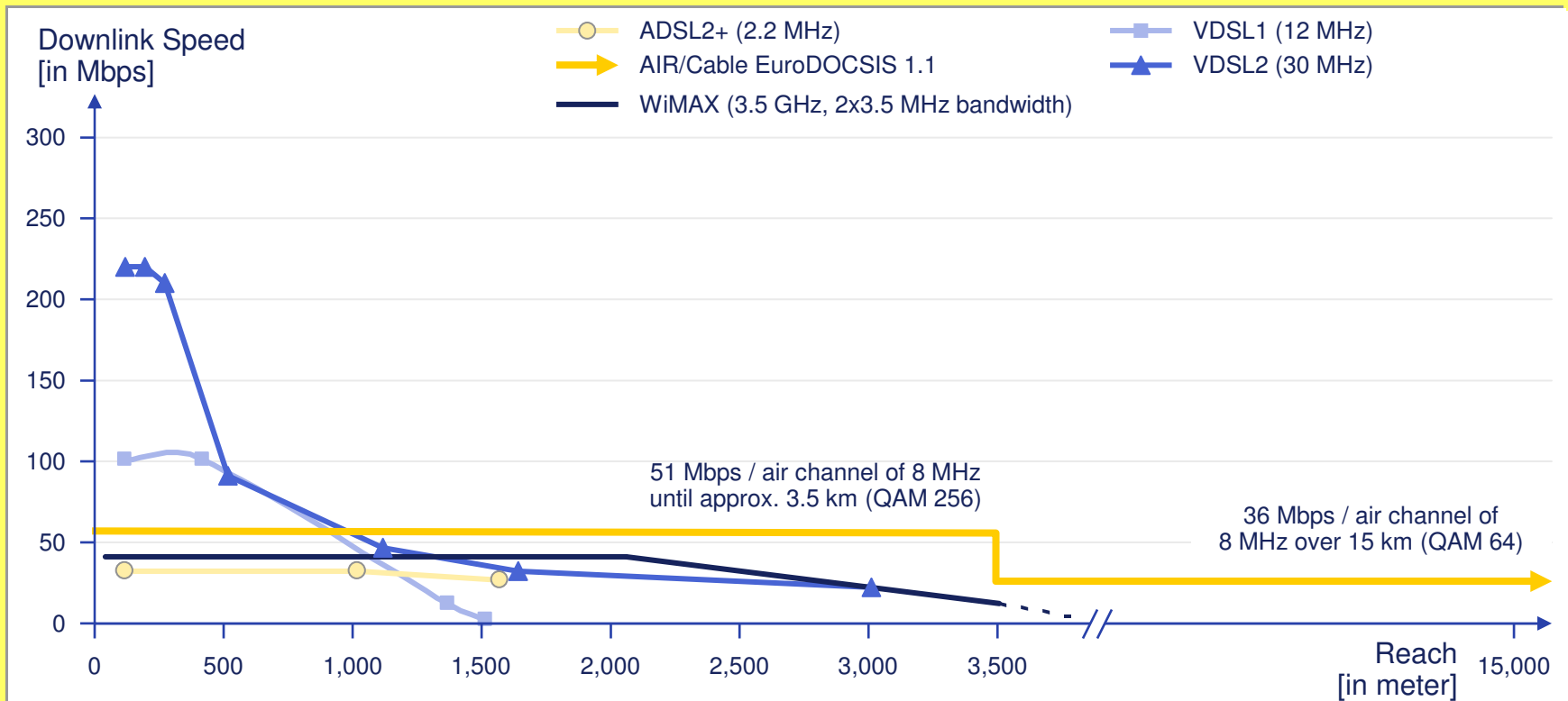
- Tested frequencies are:
 - 5.4 – 6.4 GHz downstream and upstream
 - 10.7 – 11.7 GHz downstream, possible also upstream
 - 11.7 - 12.5 GHz downstream
 - 17.1 - 17.3 GHz upstream
- Other frequencies can also be used by rebanding the system

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System Introduction – Spectrum Efficiency

AIR provides higher broadband access speeds than competing technologies at distances above one kilometer from the base station

Big capacity and big range



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System Introduction – Ideal Coverage

AIR is ideal to cover vast areas with low population density, suburban areas, small to medium cities and even densely populated city centres

Ideal Range & Coverage

AIR is ideal to cover low or densely populated areas*

Areas with low population density

- The AIR system is ideal to cover vast areas with low population density as one base station can cover over 800 square kilometers at a radius of 15 kilometers and an ideal topography



Suburbs

- The AIR system is ideal to cover suburban areas if the base station is put on a surrounding hill or mast. Family houses can install outside antennas with line-of-sight connection to the base-station



Small to medium cities

- The AIR system is very well suited to cover small to medium sized cities. Multi-apartment buildings can have line-of-sight connections via roof-top antenna



Large cities

- The AIR system can also be used to cover very densely populated areas up to skyscraper areas by placing AIR base stations on high buildings, on transmission masts or on surrounding hills



*) line-of-sight connection required

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System Introduction – Comparison to other Access Networks

AIR compares favorably to other Triple Play ready access networks and can be rolled-out instead of these networks or as a complement to them

Comparison to other Access Networks

		AIR	WiMAX 802.16d	DOCSIS via cable networks	ADSL2+	VDSL2	FTTH
Technical	IP bandwidth	●	◐	●	◐	●	●
	Triple play ready	●	○*	●	◐	●	●
	Future proof	●	●	●	◐	●	●
	Fast roll-out times	●	●	◐	◐	◐	◐
Coverage	Very dense city areas (e.g. city centres)	◐	◐	●	●	●	●
	Small / medium cities; suburbs	●	●	◐	◐	◐	◐
	Areas with low population density	●	●	◐	◐	○	○
Commercial	Low Capex intensity	●	◐	◐	◐	◐	○
	Equipment costs / subscriber**	◐	◐	●	◐	◐	◐




*) only if combined with DVB-T to a hybrid solution
 **) customer premises equipment and installation costs

● very well fulfilled / suited ◐ medium ○ less well fulfilled / suited

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System Introduction – Service Offers

Operators of an AIR network can offer attractive VoIP, bi-directional broadband Internet and digital TV bundles (Triple Play) to their customers

Service Offers	
Voice	 <ul style="list-style-type: none">■ Customers can use Voice over IP (VoIP) telephony with an IP phone or with standard analogue or ISDN phones and they can use traditional fax-machines■ The VoIP solution uses the SIP protocol, offering full ISDN features and a range of additional functionalities
Broad-band	 <ul style="list-style-type: none">■ The broadband speed of commercial offers depends on the system configuration and on the number of users<ul style="list-style-type: none">– With 296 MHz downlink spectrum, an AIR operator can for example offer 612 Mbps downstream broadband speeds and 80 digital TV channels or up to 1.3 Gbps if no TV channels are being offered. With additional 294.4 MHz uplink spectrum, up to 368 Mbps uplink speeds could be offered– If e.g. 612 Mbps downstream speeds are being offered, an AIR operator could for example guarantee a downstream speed of 4.9 Mbps to up to 2,500 users within one cell*– If the entire spectrum is used for TV or for broadband emission only, then up to 148 TV channels or up to 1.3 Gbps downstream speed can be offered
TV	 <ul style="list-style-type: none">■ A program package of digital TV channels can be offered to clients. If e.g. 160 MHz spectrum is reserved for digital TV broadcasting, then 80 TV channels can be offered in DVD quality■ Operators can offer additional services such as pay-per-view or video on demand

*) 612 Mbps shared downlink broadband speed / 2,500 users times an overbooking factor of 20 = 4.9 Mbps

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System Introduction – Service Offers

AIR enables operators to offer a range of add-on services, including pay-per-view, video on demand, video surveillance or telemetry services

Additional Service Offers – Exemplary Value Added Services Offers

Pay-per-View	Video on Demand	Video Surveillance	Telemetry
			
Technology			
<ul style="list-style-type: none"> ■ DVB-T point-to-multipoint broadcasting 	<ul style="list-style-type: none"> ■ IP streaming 	<ul style="list-style-type: none"> ■ IP streaming or DVB-T 	<ul style="list-style-type: none"> ■ IP streaming
Application			
<ul style="list-style-type: none"> ■ Premium content, e.g. blockbusters, adult entertainment, ... ■ Electronic billboards 	<ul style="list-style-type: none"> ■ TV archive ■ Personal video recording 	<ul style="list-style-type: none"> ■ Site monitoring ■ Road/Traffic monitoring 	<ul style="list-style-type: none"> ■ Measuring the audience of TV channels ■ Site monitoring

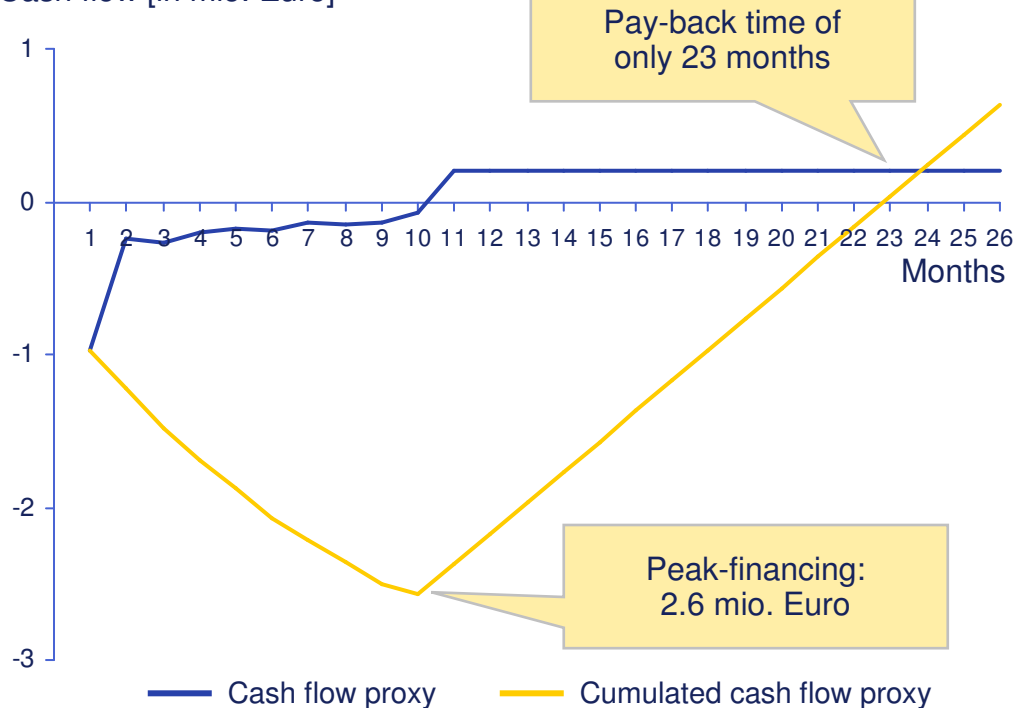
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Benefits for fixed triple play operators – Attractive Pay-back Periods

Fixed triple play operators can achieve pay-back of their investments into AIR within 23 months in a sample calculation

Attractive Pay-back Periods

Cash flow [in mio. Euro]



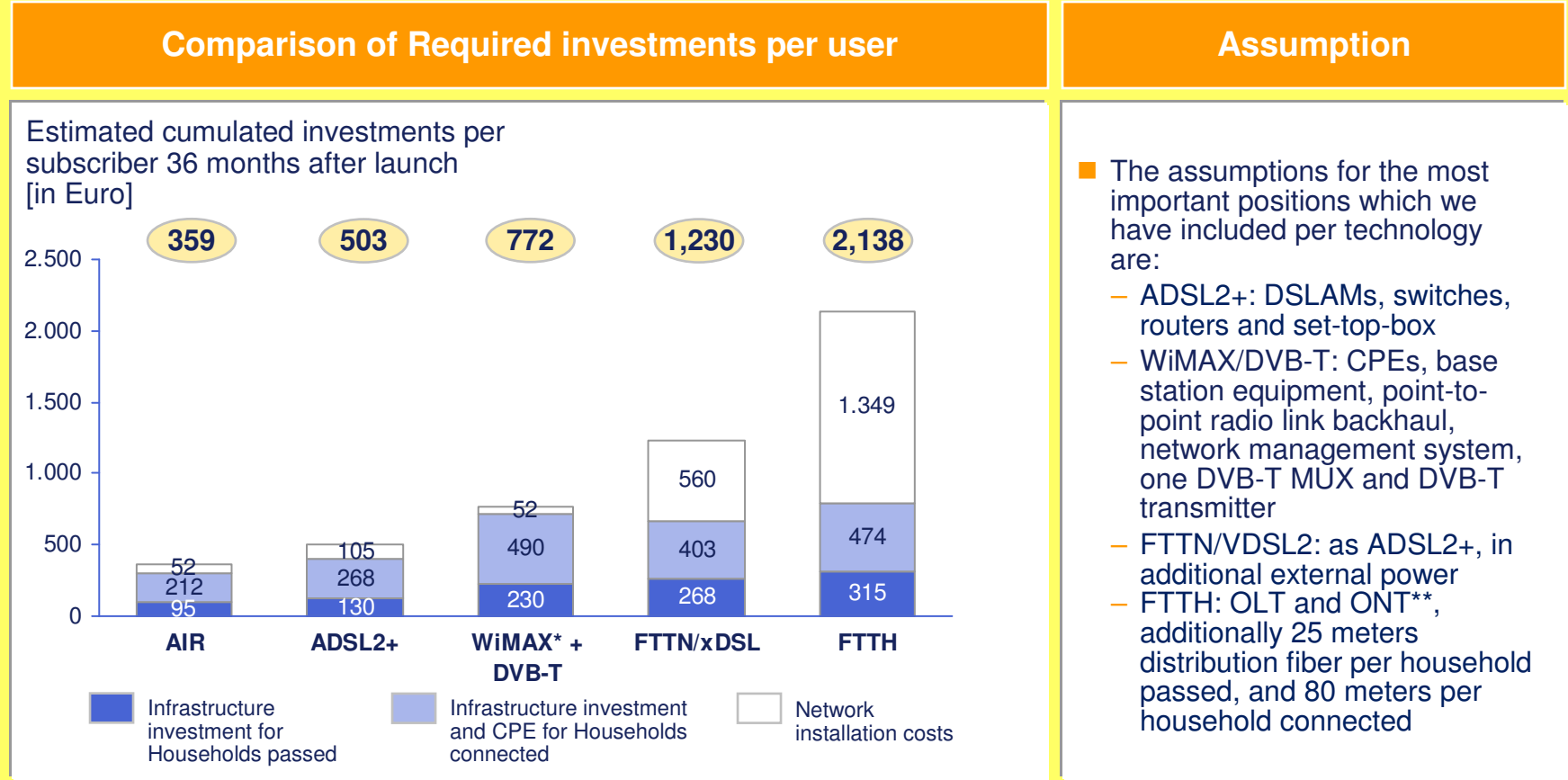
Key Assumptions*

- The sample calculation assumes
 - 10,000 subscribers and an average ARPU of 24 Euro
 - a very lean network with one main station and two base stations
 - and fully subsidized customer equipment (cable modem, DVB-T set-top-box and reception dish) as well as fully subsidized installation costs
- Ongoing network maintenance is very economic as both the main station and base stations can be managed remotely
- The calculation excludes possible payments for receiving and using frequencies as these differ from country to country
- Please contact us for an individualized return on investment calculation tailored to your situation and key assumptions

*) Please contact us for an individualized return on investment calculation tailored to your situation and key assumptions

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Business Opportunity – Comparison of Required Investments
To roll-out an AIR network costs only on average 350 Euro per subscriber, substantially less what is needed for competing technologies



Source: Globtel, Arthur D. Little analysis *) At 5 GHz with 5 MHz bandwidth **) OLT: Optimal line Terminal, ONT: Optimal network termination

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Alternative operators, cable operators, fixed incumbents as well as mobile operators and non-telcos companies should consider to roll-out AIR

AIR: Types of Operators that should adopt AIR

- **Alternative operators and ISPs** should consider to roll-out AIR in order to offer attractive Triple Play services and to become independent from the incumbent
- AIR is an ideal solution for **cable operators** wishing to be able to offer Triple Play bundles expanding the geographic reach of their cable networks
- **Fixed incumbents** should consider to roll-out AIR in order to expand the reach of their current Triple Play ready networks
- **Mobile operators** may consider to roll-out AIR as a means to offer Quadruple Play bundles (stationary Triple Play plus mobile)
- **Non-telecommunications companies** should consider to roll-out AIR in order to grasp an attractive business opportunity and to potentially re-use owned spectrum and existing infrastructure

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Please visit our homepage for more information or contact us to discuss potential projects such as setting-up a test network

Thank you very much for your attention!

We invite you to contact us, to visit our homepage or to visit us in Slovenia to see our AIR system working. Please feel free to contact us for any further information:

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