

# **Designing the Wireless Business**

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# About the Author

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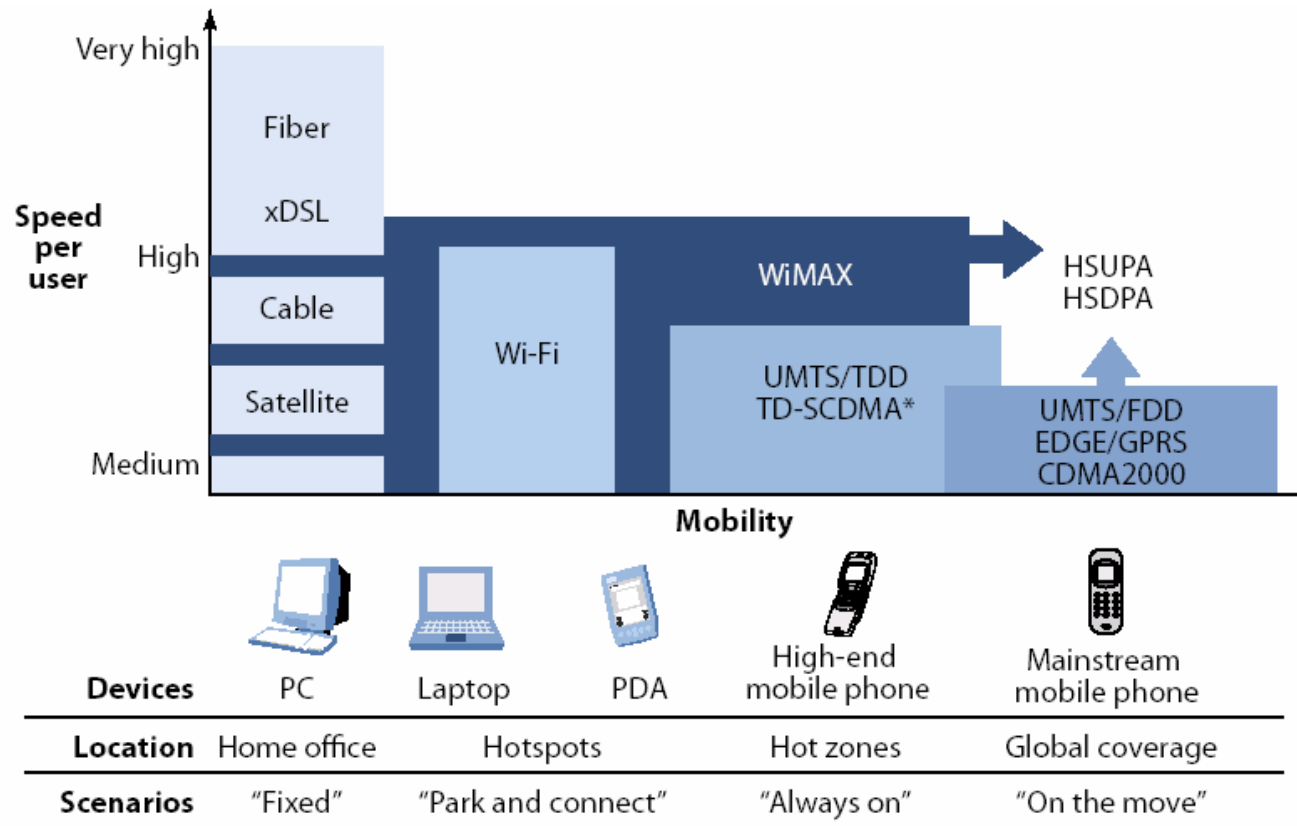
- Jaroslaw M. Janiszewski
  - obtained his PH.D. in telecommunications from the Wrocław University of Technology in 1984
  - He was working there as a researcher and lecturer from 1983 to 1997
  - Then he joined the board of the independent telecom operator, holding the post of CTO and CEO. He participated in the start-up of a telecom operator (from 3 employees in 1997 to over 1200 in 2002)
  - From 2002 he came back to Wrocław University of Technology.
  - Presently, he is holding the post of a docent (lecturer).
  - His interests cover radiocommunications including propagation, radio systems (mobile, Wi-Fi, WiMax ...), electromagnetic compatibility and business aspects of telecommunications.
  - He also works as an independent expert and advisor.
  - He has published more than 45 papers.

# Agenda

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- Wireless data transmission
- Business planning (on case study basis)
  - Strategic objectives
  - Marketing
  - Network
  - Operation
  - Financial indicators
- Case study results
- Summary

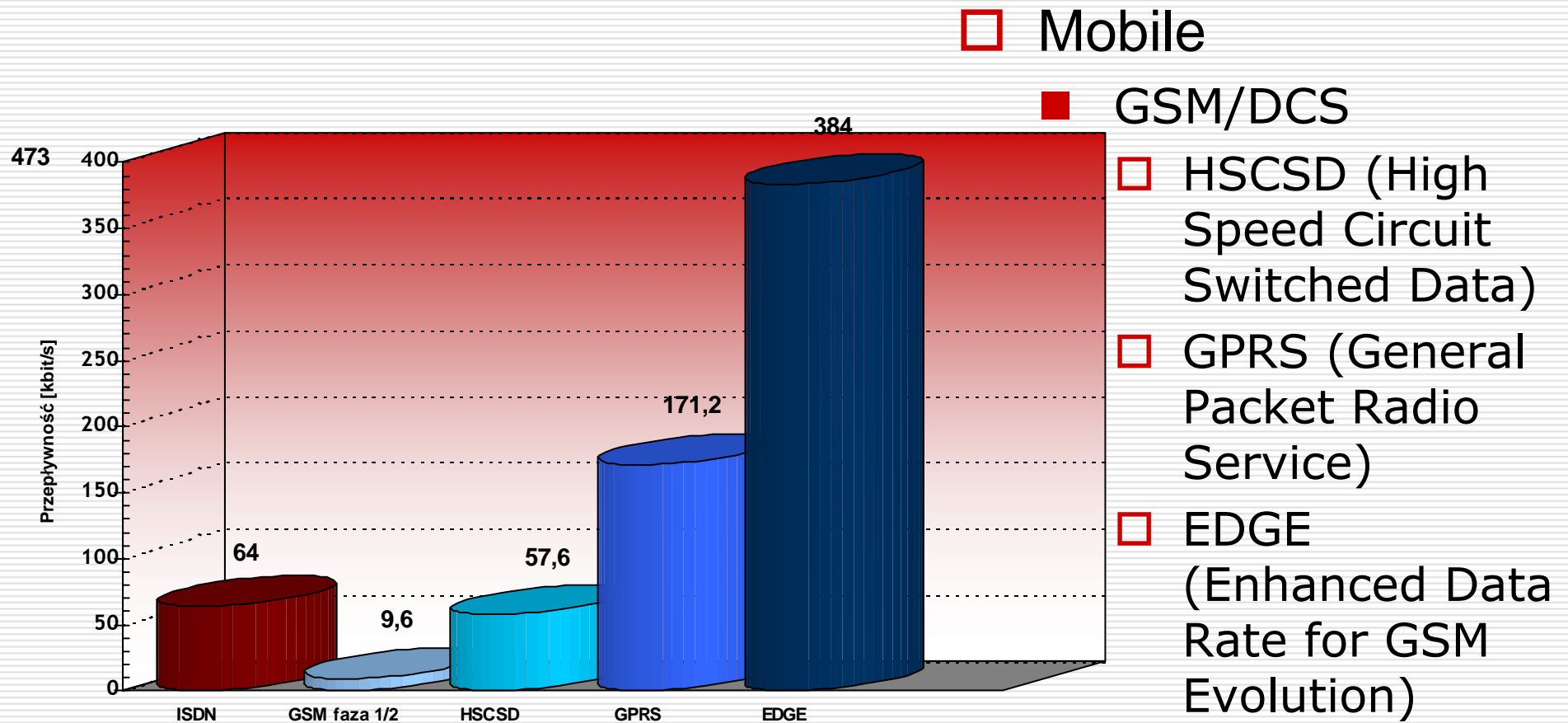
# Data transmission



\* Time-division synchronous code-division multiple access

Source: Alcatel and Forrester Research, Inc.

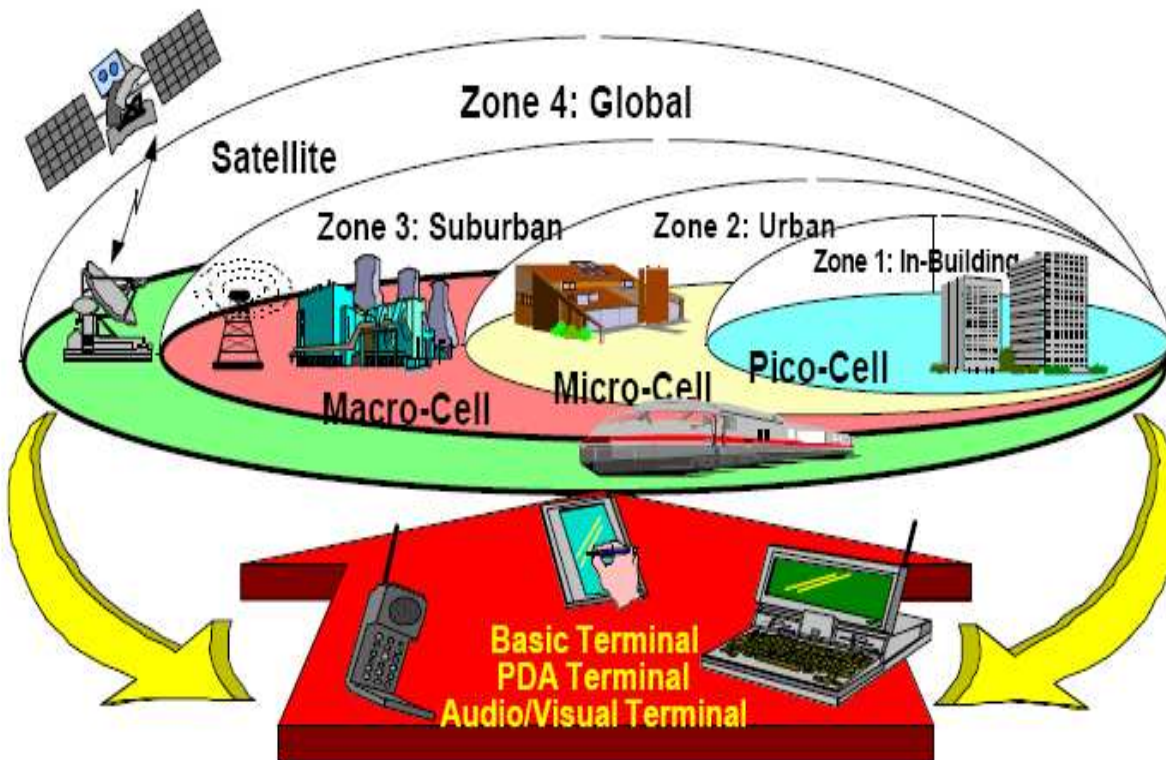
# Wireless technology (1)



# Wireless technology (2)

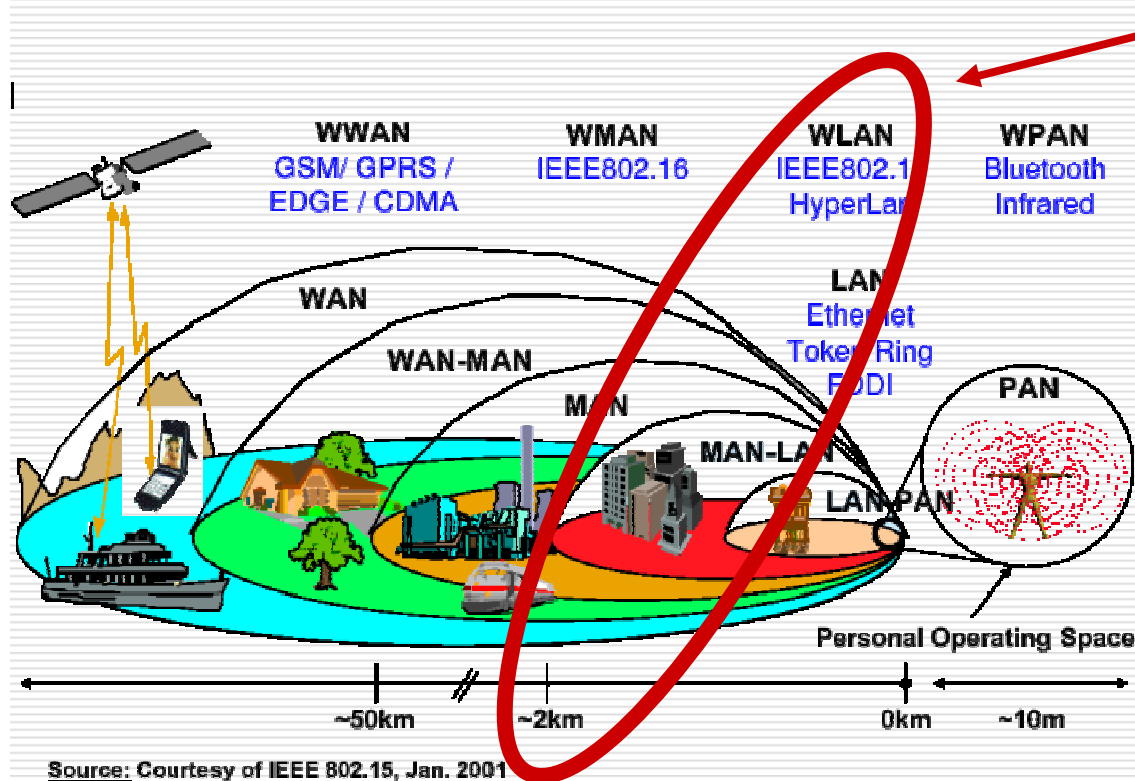
## □ 3G

- UMTS -Higher speed
  - 384 kb/s
  - HSDPA (High Speed Downlink Packet Access) – up to 14 Mb/s
- CDMA EVDO
  - 2,4 – 3,1 Mb/s (comparable with ADSL)



Source: Ibrahim A. Ghaleb

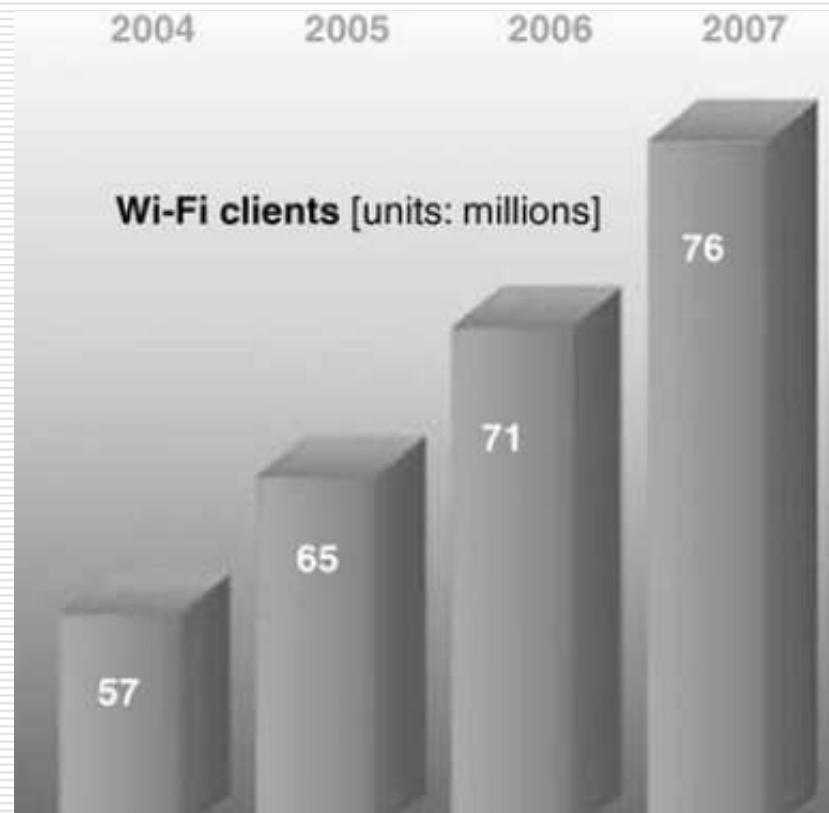
# Wireless technology (3)



- WLAN – IEEE 802.11 – Wi-Fi
  - Standard IEEE 802.11b – 11 Mb/s
  - Standard IEEE 802.11g – 54 Mb/s
- WMAN – IEEE 802.16 – WiMax
  - Up to 70 Mb/s

# Wi-Fi

- Wireless Fidelity
  - Standard IEEE 802.11b – 11 Mb/s
  - Standard IEEE 802.11g – 54 Mb/s
- Frequency band 2,4 GHz
  - Unlicensed (ISM – Industrial, Scientific, Medical)
  - Limited power (in Poland: EIRP < 100 mW)
  - Interferences (WiLL – eg. MultiGainWireless, BlueTooth, microwave ovens ...)
- Access to Internet (hotspots)
- Growing clients
- Link Wi-Fi Alliance: [www.wi-fi.org](http://www.wi-fi.org)

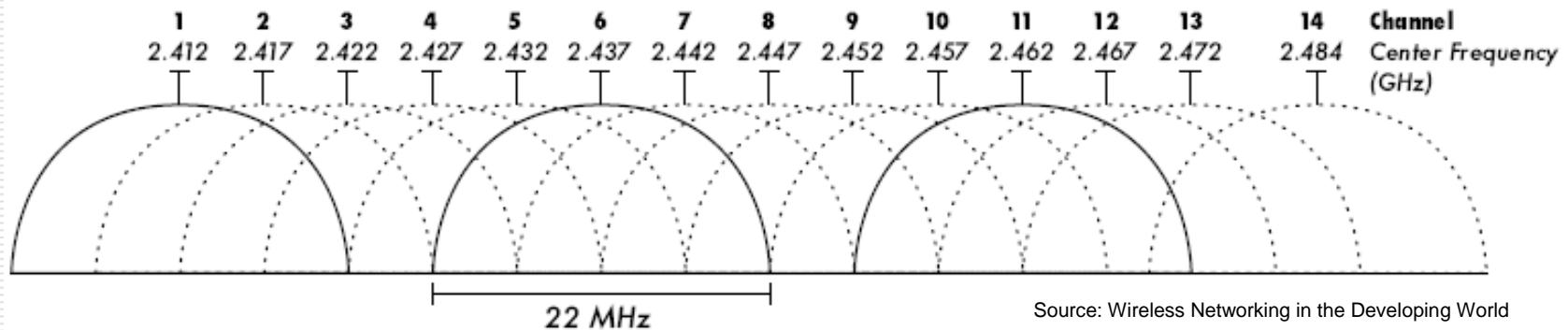


Source: Deepak Pareek, The business of Wimax, Wiley, 2006



# Wi-Fi – frequency plan

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- ❑ Channel bandwidth 22 MHz
- ❑ Only 3 channels (1, 6, 11) do not overlap

# Wi-Fi – pro i cons

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- Advantages
  - Unlicensed frequency
  - Cheap equipment
    - Built-in in notebook, PDA
    - Adapters (PCMCIA, PCI)
    - Access points
- Disadvantages
  - Interferences
  - Security
  - Short ranges
- Good solution for developing markets



# Wi-Fi trends

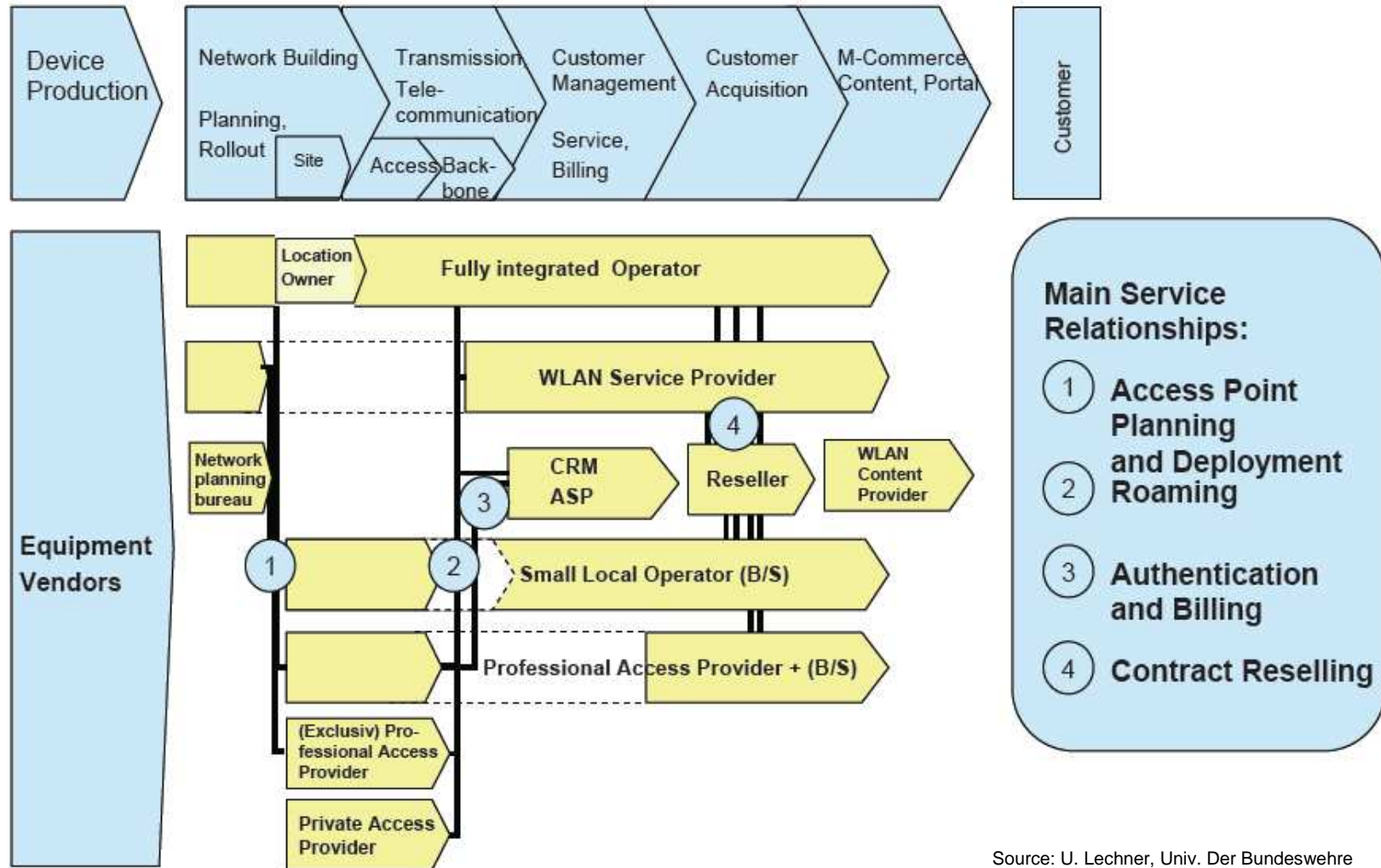
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- ❑ Wi-Fi includes wireless standards 802.11, 802.11a, 802.11b, and 802.11g represents a small but quickly growing component of wireless communications services
- ❑ The proliferation of Wi-Fi access points (hot spots), expansion of wireless corporate LANs and growth in the use of network interface cards (NICs) as standard equipment in laptops are the reasons for boost in spending
- ❑ Spending on Wi-Fi infrastructure equipment is expected to total \$7 billion in 2008, a 12.6% compound annual increase
- ❑ Spending on Wi-Fi services is expected to reach \$335 million by 2008
- ❑ Aggregate revenue is expected to remain relatively low because most Wi-Fi services are offered either free as a promotion or bundled with other services
- ❑ Wi-Fi is not expected to become a significant source of service revenue by itself. Rather, it is expected to stimulate other revenue by attracting business and by growing the equipment market

Source: Deepak Pareek, The business of Wimax, Willey, 2006

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# VALUE CHAIN WLAN HOT-SPOT



Source: U. Lechner, Univ. Der Bundeswehr

# WLAN business models

#	Business Model	Value Chain	Owner Ship	Resources	Description	Examples
1	Fully Integrated Operator	All Parts	Big National Company	Exclusive Production	National offer of WLAN Internet Access in Hot Spots. Owning most Access Points as well having Roaming agreements with some access point owners.	BT, T-Mobile (Mobil Star), etc.
2	WLAN-Service Provider	Customer Mgt, Acquisition + (Content)	Big National Company	Exclusive Production	National offer of WLAN Internet Access in Hot Spots. Relying only on roaming agreements with access point owner.	iPass
3	CRM ASP	Customer Mgt	Big National Company	Exclusive Production	Provides Access Point owner with customer authentication and billing functionality. Coordinates Roaming agreements.	monsoon
4	WLAN-Content Provider	WLAN-Content	Big National Company	Exclusive Production	Specialized in location based Services and Content for WLAN.	
5	Network Planning Bureau	Network Planning & Deployment	Big National Company	Exclusive Production	Specialized in planning and deployment of WLAN access points for third parties.	signa
6 17	Small Operator (B/S)	Access, Customer Mgt, Acquisition (+Content)	Local Company/ National Company	Side Production with resource advantage	Offers existing customer base an additional service only in this location.	Hotels, Airline Lounges, Restaurants

Our case



Note: B = Big company; S = Small company, (...) optional value chain  
J.M. Janiszewski

Source: U. Lechner, Univ. Der Bundeswehre

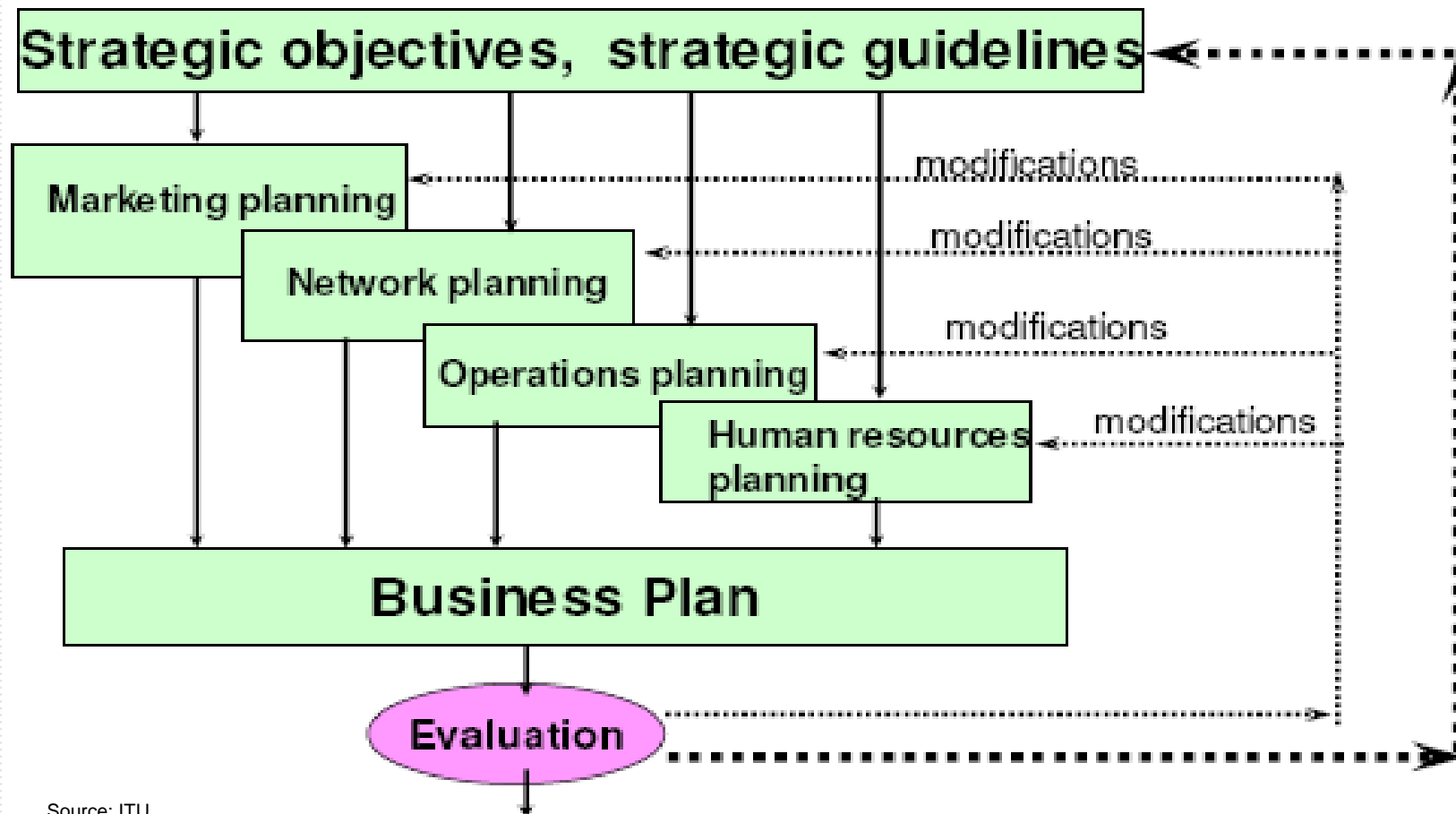
# Business plan definition

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**A Business Plan** presents the calculation of the financial indicators that enable the managers to evaluate the financial performances of an enterprise in order to take decisions

- **A Business Plan** summarises the results of the planning process:
  - the objectives to reach ( subscribers demand, sales)
  - the description of all activities requested by the project
  - the future revenues expected from the project
  - the planned expenses (investment and operations)
  - the accounting statements and the financial indicators characterising the profitability of the project

# Business planning



Source: ITU

# Strategic objectives

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- To built the wireless network for rural area and small cities
- To offer the access to internet
  - Broadband (speed higher than ISDN - 144 kb/s)
  - Good quality
  - Competitive price
- Payback period less than 5 years
- To organize a good business for several years for the owners



# Case study -assumptions

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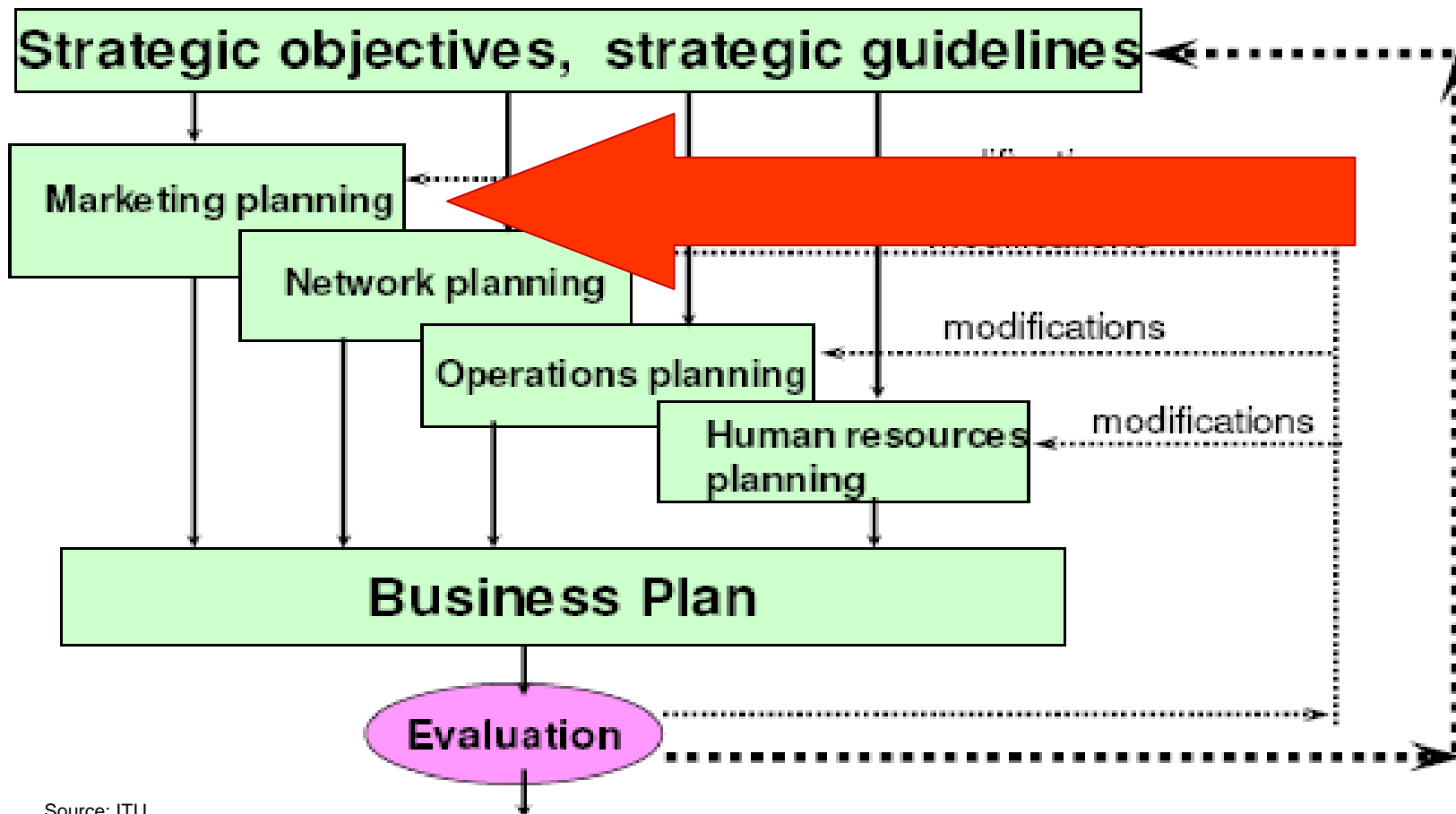
- Wireless network for province in Poland
- Low cost network
  - Unlicensed frequencies (in Poland)
    - 5,6 – 5,8 GHz (IEEE 802.11 a)
    - 2,4 GHz (IEEE 802.11 b/g)
  - Cheap equipment
- Basic services – Internet Access
  - 512 kb/s – class A
  - 256 kb/s – class B
- Competitive tariffs

# Requirements for competition

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- Customer segmentation
  - Residential
  - SOHO (Small Office Home Office)
  - SME (Small Medium Enterprise)
  - Company
- The best customer segment to address
- The best service for customer with competitive price
- Objectives:
  - maximize profitability
  - Reduce CAPEX and OPEX

# Business planning



Source: ITU

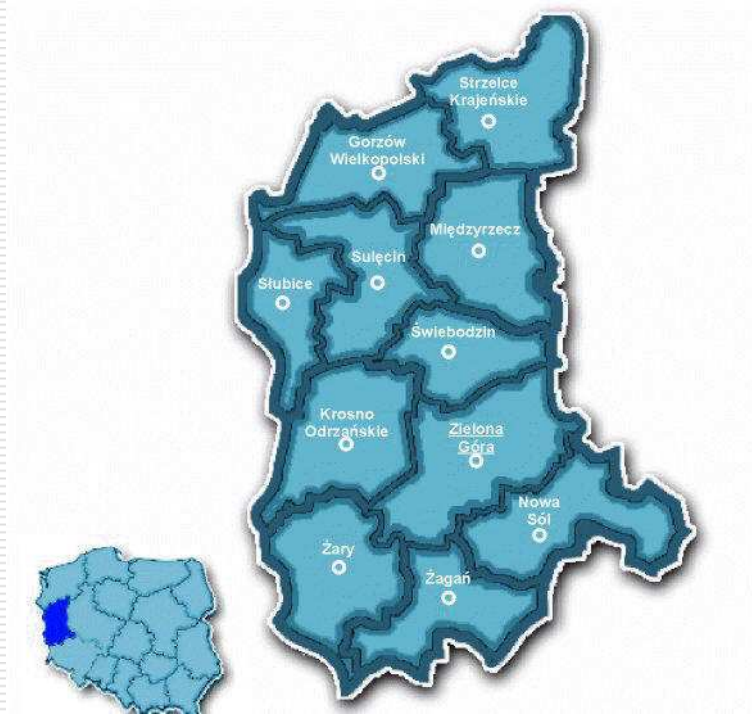
# Marketing planning

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- Area selection
- Competition analysis
- Services
- Tariffs
- Market (population, households, purchase power)

# Area selection

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Zielona Góra (Green Mountain) province excluding capitol of province

- Population 89000
- Households 24000

Competition

- Polish Telecom (TP - the biggest fixed company) – ADSL
- Mobile operators

# Competitive services and prices

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- ADSL offered by TP
  - Problem with old infrastructure
    - Long cooper wires, not sufficient for xDSL
  - Customer relationships (monopolist for years - aversion, improper customer care, difficult contact – only by Call Center)
  - Too expensive (data with voice) from 60 PLN (limited time - promotion) to 150 PLN
- Mobile operators
  - Too slow
    - Only GPRS, from time to time EDGE
  - Limited transfer
  - Price
    - Additional modem (USB or PCMCIA to laptop)
    - Monthly fee 60 PLN (1GB limit)
- There is room for broadband access for less than 50 PLN

# Services and prices

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## Interenet Access

- Class A – residential – 256/128 kb/s
- Class B – SOHO – 512/128 kb/s

## Net prices in PLN in brackets plus VAT

	Installation fee [PLN]	Monthly fee [PLN]
Class A	81,15	45,90 (56)
Class B	40	40,16 (49)

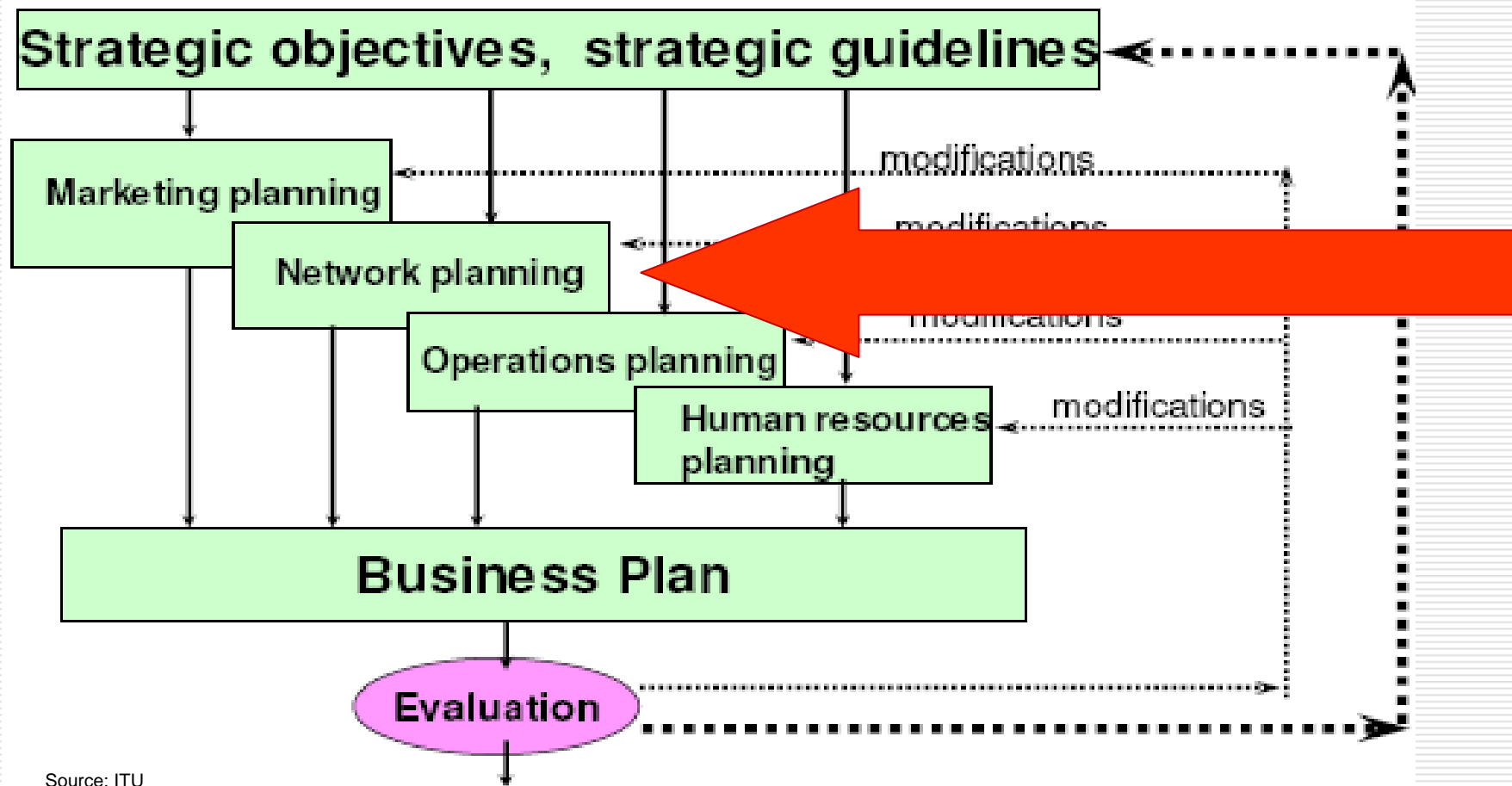
# Market

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- Population 89 000
- Households 24 000
- Computer penetration
  - Poland more than 50%
  - In rural areas 30%
- Market share
  - According to experience market share is 10% of households (2400)
    - 20% SOHO and 80% residential
  - Number of potential clients can be predicted on the basis of the market research
- Number of villages and number of households
- Case study – 1900 users (80% from 2400 in network coverage)
  - (20% SOHO – 380; 80% - 1520)
- Purchase power
  - Acceptable price for Internet access – less than 50 PLN
- 2 years subscriber penetration target

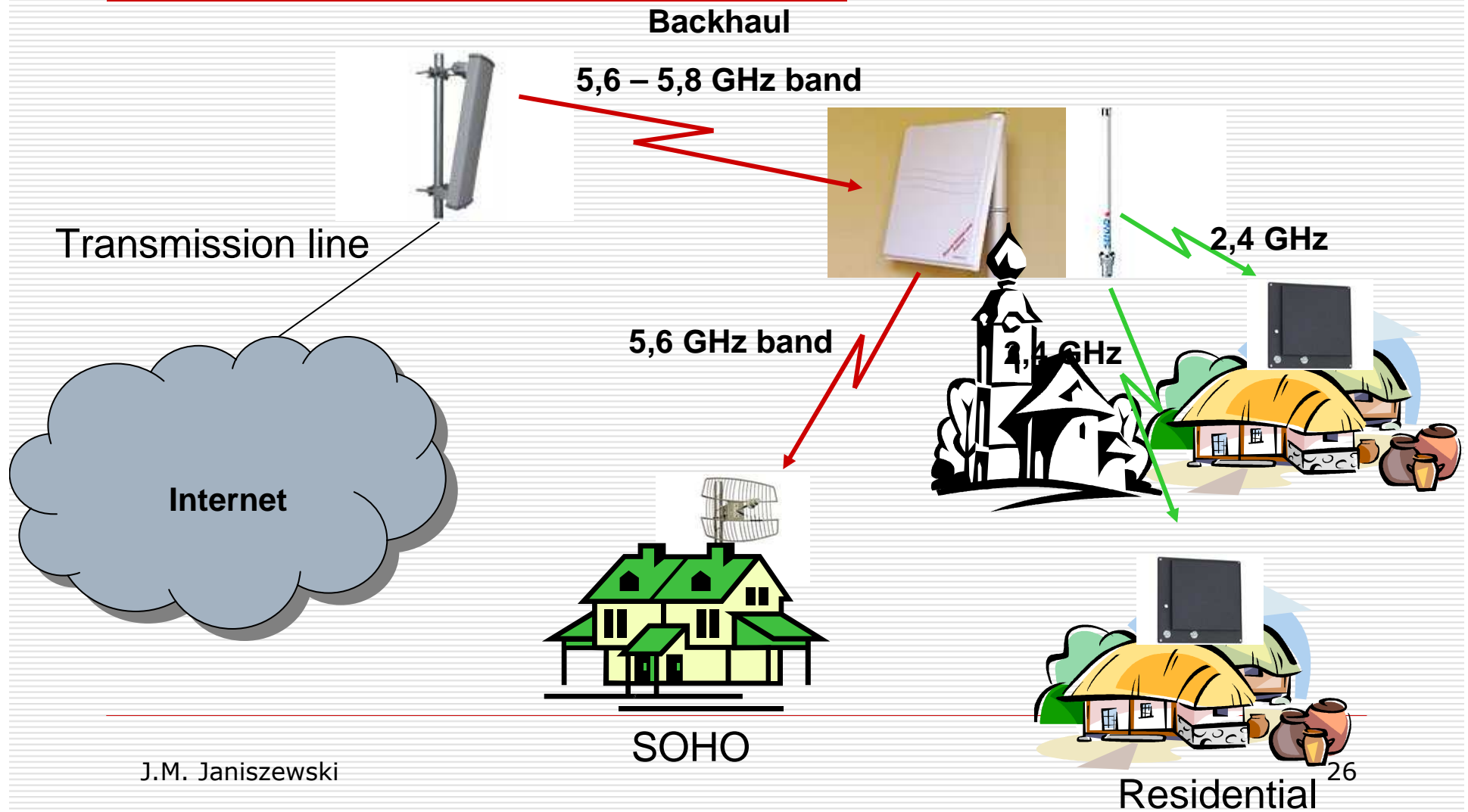


# Business planning

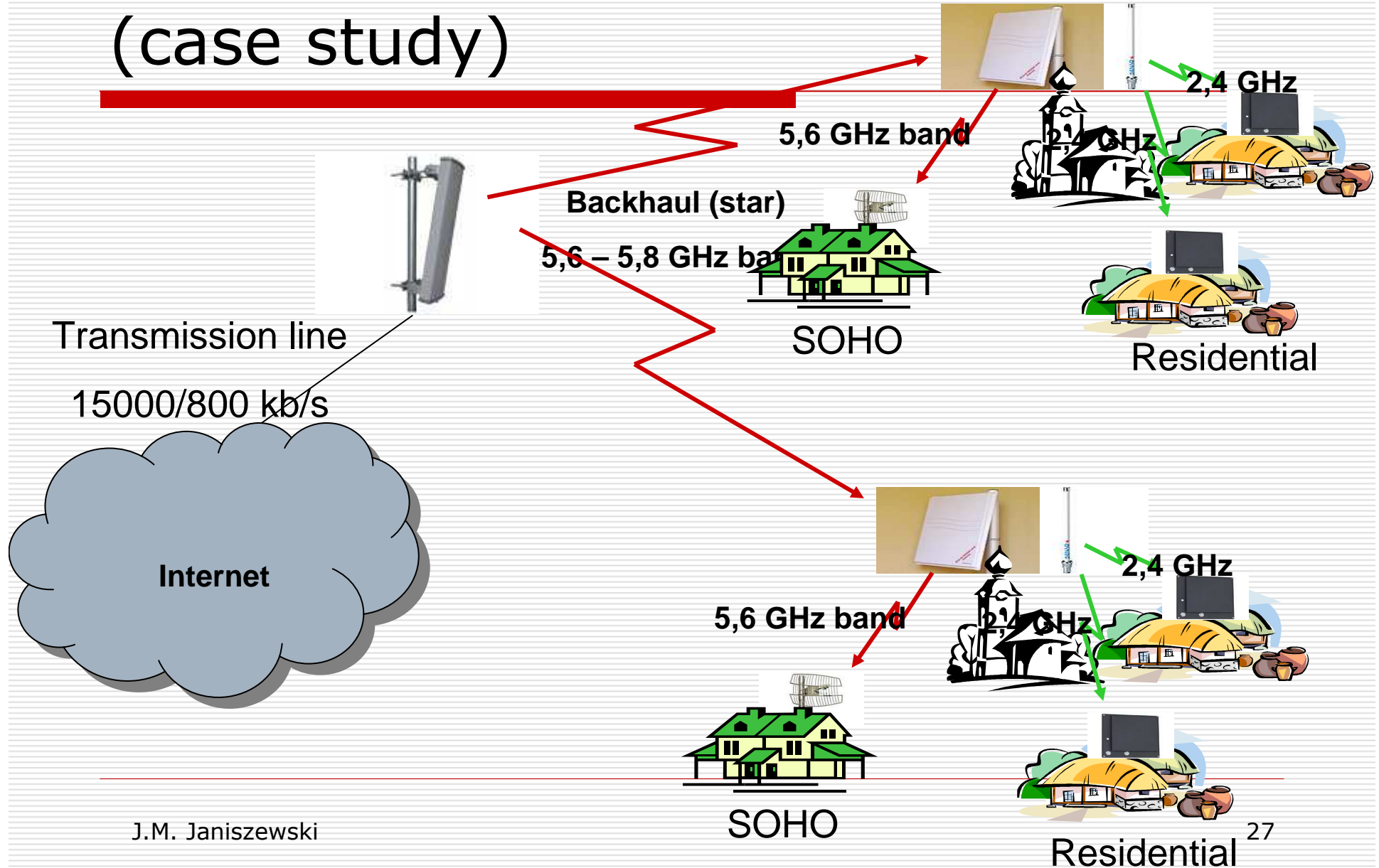


Source: ITU

# Wi-Fi Network Architecture (case study)



# Wi-Fi Network Architecture (case study)



# Network planning

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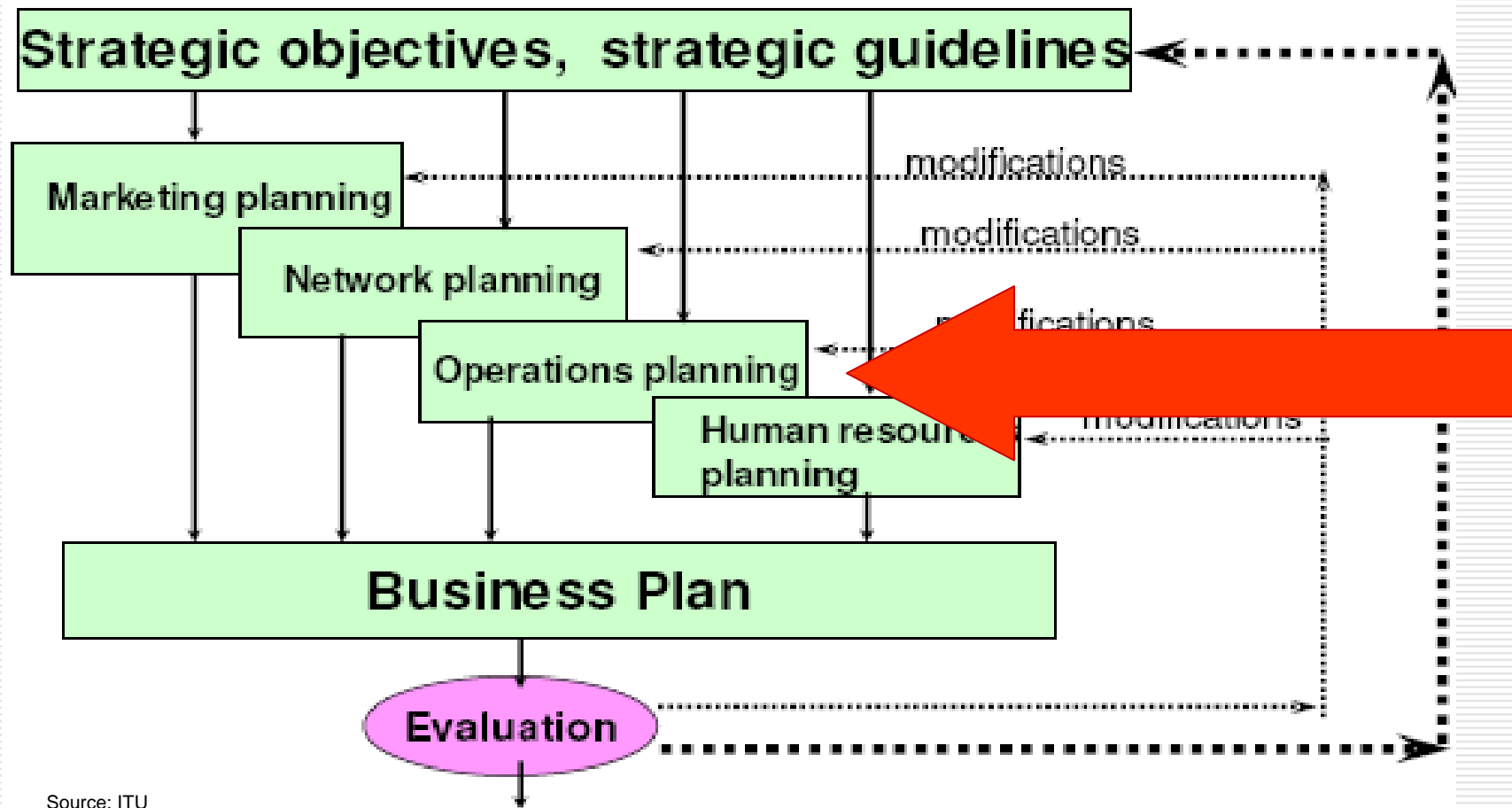
- General concept
- The choice of equipment
- Planning criteria
  - Coverage
  - Capacity
  - Throughput
- Data to business plan
  - Number of stations, locations
  - List and prices of equipment
  - Costs of operation (labour costs, power, rental of towers)
  - CAPEX

# Network planning results

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- One location – three Access Points (2-3 AP2,4;1AP5,6)
- 30 clients for one AP (2,4 GHz)
- 38 base stations (locations)
- 1900 CPE (Customer Premises Equipment)
- MikroTik equipment ([www.mikrotik.com](http://www.mikrotik.com))
- Roll-up – 4 stations/month
  - Organization limitations
- Backhaul based on radio transmission – 5,6 GHz band(IEEE 802.11a)
- Customer access
  - Class A – 5,6 GHz
  - Class B – 2,4 GHz

# Business planning



# Operations planning

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- Technical operations
  - Transmission
  - Interconnection
  - Rental (cars, towers, buildings)
  - Maintenance
- Commercial operations
  - Marketing (Customer Care, Promotion..)
  - Sales
  - Billing (calculation, invoice, money collection)
- Administrative operations (back office)

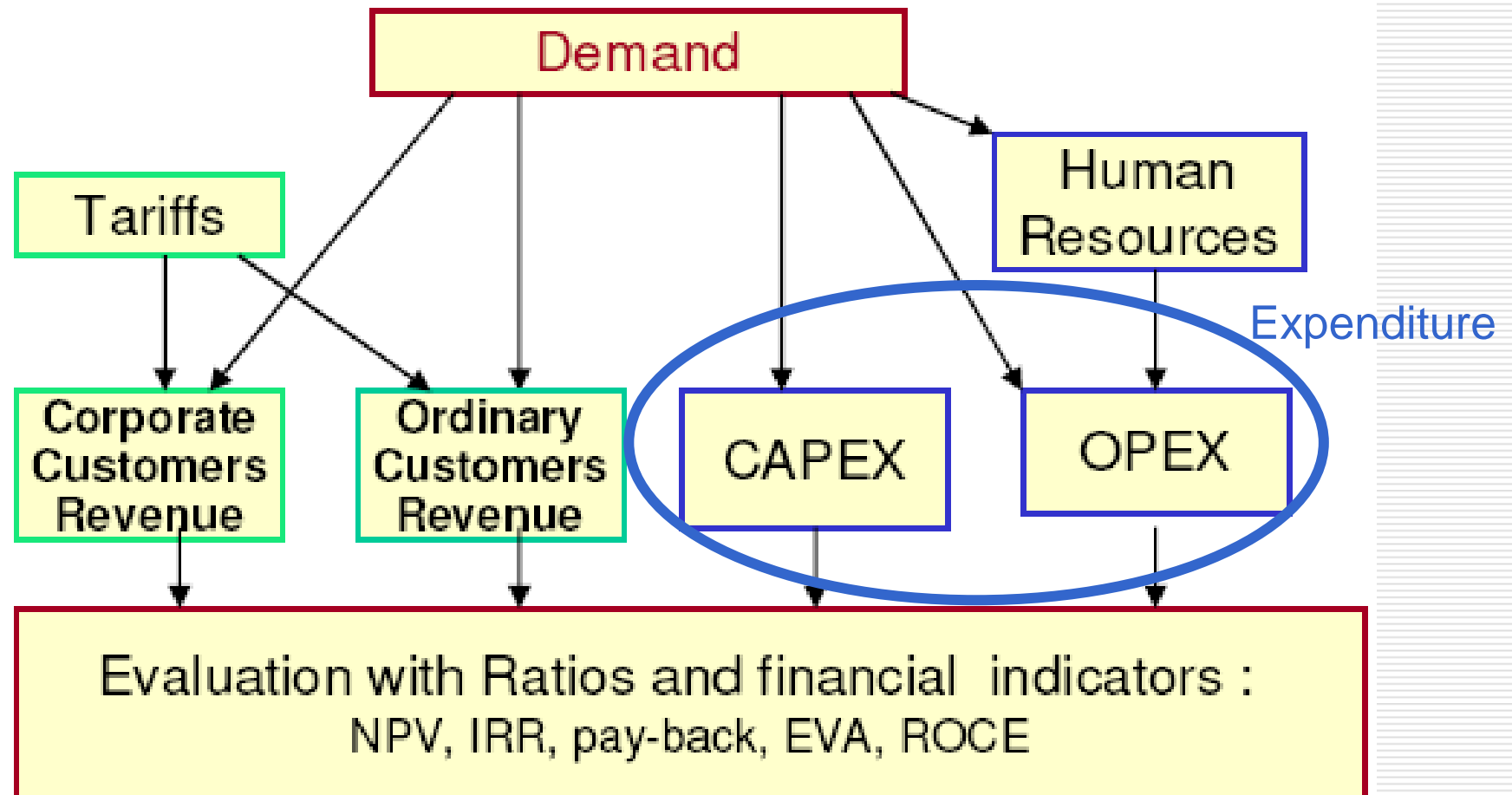
# Human resources

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- The number of workers depends on
  - Roll-out plan
  - Number of subscribers
  - The concept of back office
    - Outsourcing (accounting, invoice printing and delivering...)
- Timetable of employment – the data to business plan
- Costs of employment play important role in economic results



# Business model elements



Source: ITU

# Expenditure (1)

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- CAPEX – Capital Expense
  - Includes the investments to:
    - The network infrastructure and devices
    - The hardware for network management and billing (charging)
- Components
  - Base stations (Access Points)
  - Core network equipment (backhaul)
  - Site preparation (site acquisition, civil works, power, antenna system, transmission)
  - Service platforms
  - Spectrum (if obtained in result of the tender)
- Incured only once

# Expenditure (2)

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- OPEX – Operational Expense
  - Includes:
    - The labor costs
    - Expenses for managing the network
    - Expenses for marketing, sales and customer care
  
  - Three different kinds of costs
    - Customer driven – terminal subsidies, dealer commissions
    - Revenue driven – costs related to generated traffic eg. interconnection, promotion
    - Network driven – associated with the operation of the network eg. transmission, site rentals, operation and maintenance

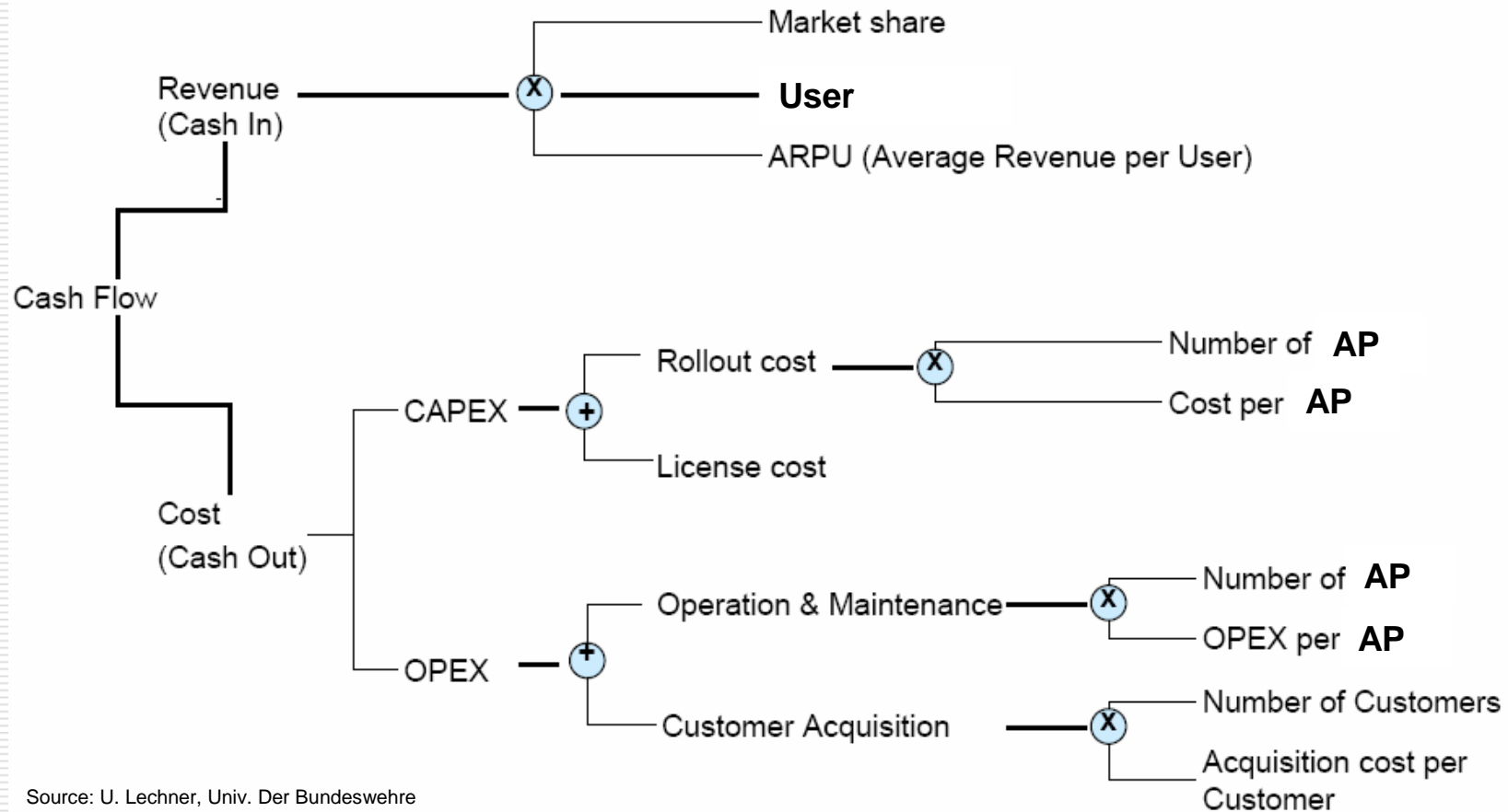
# Full costs

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Source: ITU

# Cash flow



Source: U. Lechner, Univ. Der Bundeswehre

# NPV – Net Present Value (1)

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- Each cash inflow/outflow is discounted back to its present value. Then they are summed. Therefore

$$\text{NPV} = \sum_{t=0}^n \frac{C_t}{(1+r)^t} = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0$$

- Where
  - $t$  - the time of the cash flow
  - $n$  - the total time of the project
  - $r$  - the discount rate
  - $C_t$  - the net cash flow (the amount of cash) at that point in time.
  - $C_0$  - the capital outlay at the beginning of the investment time (  $t = 0$  )
- Discount rate on the level between 7 – 10 % (comparable to deposit interest)

# NPV (2)

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- Net Present Value (NPV) is one of the most robust financial tools available to analyze any type of investment or activity. NPV has four key elements to evaluate an investment:
  - **Time Value of Money** - NPV recognizes the concept that the money earned today is worth more than the money earned five years from now
  - **Cash Flows** - NPV calculates a project's expected cash flows and includes the unique risks of obtaining those cash flows. Using NPV helps to eliminate accounting inconsistencies, since the cash flows represent the benefits of the project, not just the profits
  - **Risks** - NPV incorporates the risks associated with a project via the expected cash flows and/or discount rate.
  - **Flexibility** - NPV provides flexibility and depth, since the NPV equation can adjust for inflation and be used with other tools such as Scenario analysis and Monte Carlo simulation

# NPV – an example

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In  $t_0$  outlay  $C_0 = 1500$ ;  $r = 10\%$

Period (t)	Incomes	Costs	Cash Flow (Incomes – Costs)	Discounted CF ( $dCF = cf / (1 + r)^t$ )
1	0	1000	-1000	-909,09
2	4000	1000	-3000	-2479,34
3	4500	1000	3500	2629,60
4	4000	1000	3000	2049,04
5	2000	1000	1000	620,92
Total				1911,13

$$NPV = dCF - C_0 = 1911,13 - 1500 = \mathbf{411,13}$$

**NPV > 0** the project should be accepted



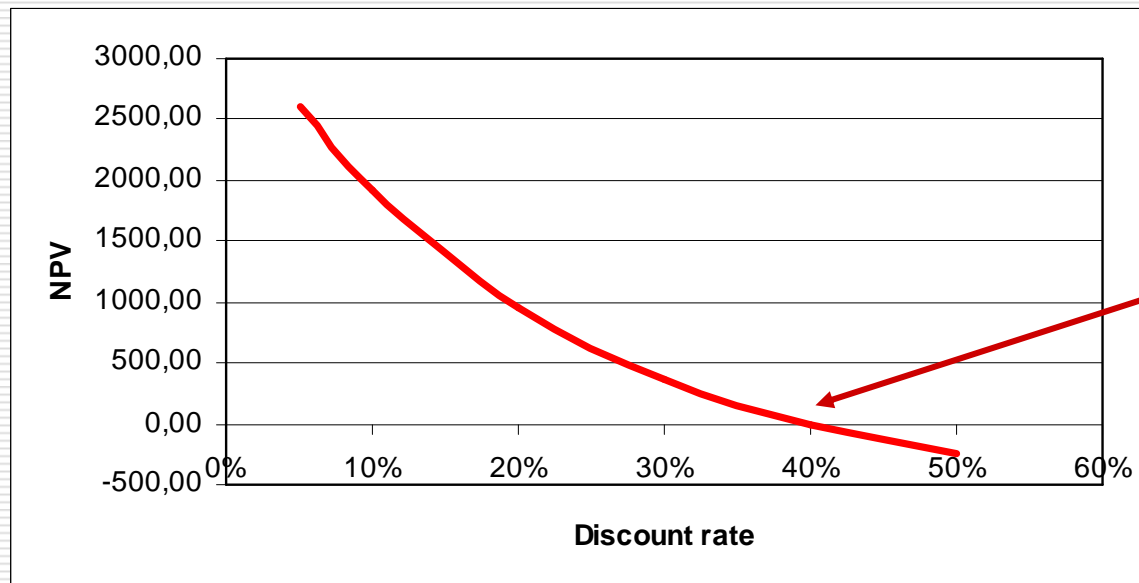
# IRR - Internal Rate of Return

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- ❑ IRR is defined as the discount rate that makes the project have a zero Net Present Value (NPV)
- ❑ IRR is an alternative method of evaluating investments without estimating the discount rate
- ❑ IRR takes into account the time value of money by considering the cash flows over the lifetime of a project
- ❑ The IRR and NPV concepts are related but they are not equivalent

# IRR – an example

Discount rate	5%	10%	20%	30%	40%	50%
NPV	2601,60	1911,13	957,43	368,42	-2,53	-238,68



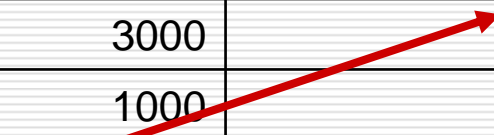
**IRR = 38%**  
**(NPV = 0)**

# Payback period

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- The Payback Period is defined as the length of time required to recover an initial investment through cash flows generated by the investment
- The Payback Period lets you see the level of profitability of an investment in relation to time
- The shorter the time period the better the investment opportunity
- In our example

Period (t)	Cash Flow (Incomes – Costs)	Cumulating CF
1	-1000	-1000
2	-3000	-4000
3	3500	-500
4	3000	2500
5	1000	3500



**Payback period is more than three years**

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# WLAN network – case study

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- Business plan components
  - CAPEX
  - OPEX
  - Incomes
- Marketing data

# List of CAPEX (in PLN)

Capex (outlay)	Amount	Price	Value
Technical projects of the base stations	38	1100	41800
Purchase of the base station equipment	38	4900	186200
Installation of the base stations	38	2400	91200
System of the network management (purchase)	1	15000	15000
Implemetation of the network management system	1	2000	2000
Purchase of the Client Relanshionships Management system	1	20000	20000
Implemetation of theCRM system	1	2000	2000
Purchase of the CPEs class A	380	405	153900
Purchase of the CPEs class B	1520	230	349600
Purchase of the serwer	1	8500	8500
Installation and start-up CPEs class A	380	140	53200
Installation and start-up CPEs class B	1520	120	182400
Purchase of the transportation means	2	31000	62000
Purchase of the work stations for management system	4	4100	16400
Purchase of the tool for technicians	4	800	3200
Sales costs	1900	0	0
Connection to national Internet	1	6000	6000
TOTAL			1 193 400

# CAPEX timetable in 2007 [PLN]

Capex (outlay)	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Connections	0	0	105	105	105	110	110	115	120	120	120	120
Technical projects of the base stations		4 400	4 400	4 400	4 400	4 400	4 400	4 400	4 400	4 400	2 200	
Purchase of the base station equipment			19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	19 600	9 800
Installation of the base stations			9 600	9 600	9 600	9 600	9 600	9 600	9 600	9 600	9 600	4 800
System of the network management (purchase)			15 000									
Implementation of the network management system				2 000								
Purchase of the Client Relationships Management system				20 000								
Implementation of the CRM system					2 000							
Purchase of the CPEs class A	0	0	8 505	8 505	8 505	8 910	8 910	9 315	9 720	9 720	9 720	9 720
Purchase of the CPEs class B	0	0	19 320	19 320	19 320	20 240	20 240	21 160	22 080	22 080	22 080	22 080
Purchase of the server		8 500										
Installation and start-up CPEs class A	0	0	2 940	2 940	2 940	3 080	3 080	3 220	3 360	3 360	3 360	3 360
Installation and start-up CPEs class B	0	0	10 080	10 080	10 080	10 560	10 560	11 040	11 520	11 520	11 520	11 520
Purchase of the transportation means			31 000									31 000
Purchase of the work stations for management system			4 100	4 100	4 100	4 100						
Purchase of the tool for technicians			1 600		1 600							
Sales costs												
Connection to national Internet			6 000									
<b>Total</b>	<b>0</b>	<b>12 900</b>	<b>132 145</b>	<b>100 545</b>	<b>82 145</b>	<b>80 490</b>	<b>76 390</b>	<b>78 335</b>	<b>80 280</b>	<b>80 280</b>	<b>78 080</b>	<b>92 280</b>

Last AP

# Capex timetable in 2008

Full capacity

Capex (outlay)	Jan	Feb	March	April	May	June	Total
Connections	120	130	130	130	130	130	1 900
Technical projects of the base stations							0
Purchase of the base station equipment							0
Installation of the base stations							0
System of the network management (purchase)							0
Implemetation of the network management system							0
Purchase of the Client Relationships Management system							0
Implemetation of theCRM system							0
Purchase of the CPEs class A	9 720	10 530	10 530	10 530	10 530	10 530	62 370
Purchase of the CPEs class B	22 080	23 920	23 920	23 920	23 920	23 920	141 680
Purchase of the serwer							0
Installation and start-up CPEs class A	3 360	3 640	3 640	3 640	3 640	3 640	21 560
Installation and start-up CPEs class B	11 520	12 480	12 480	12 480	12 480	12 480	73 920
Purchase of the transportation means							0
Purchase of the work stations for management system							0
Purchase of the tool for technicians							0
Sales costs	0	0	0	0	0	0	0
Connection to national Internet							0
							0
<b>Total</b>	<b>46 680</b>	<b>50 570</b>	<b>50 570</b>	<b>50 570</b>	<b>50 570</b>	<b>50 570</b>	<b>299 530</b>

Only CPEs

□ July 2008 – the end of investements

# Total CAPEX

**Fundamentals**



Capex (outlay)	2007	2008	Total
Connections	1 130	1 900	3 030
Technical projects of the base stations	41 800	0	41 800
Purchase of the base station equipment	186 200	0	186 200
Installation of the base stations	91 200	0	91 200
System of the network management (purchase)	15 000	0	15 000
Implemetation of the network management system	2 000	0	2 000
Purchase of the Client Relanshions Management system	20 000	0	20 000
Implemetation of theCRM system	2 000	0	2 000
Purchase of the CPEs class A	91 530	62 360	153 900
Purchase of the CPEs class B	207 920	141 680	349 600
Purchase of the serwer	8 500	0	8 500
Installation and start-up CPEs class A	31 640	21 560	53 200
Installation and start-up CPEs class B	108 480	73 920	182 400
Purchase of the transportation means	62 000	0	62 000
Purchase of the work stations for management system	16 400	0	16 400
Purchase of the tool for technicians	3 200	0	3 200
Sales costs	0	0	0
Connection to national Internet	6 000	0	6 000
<b>Total</b>	<b>893 870</b>	<b>299 530</b>	<b>1 193 400</b>



# Opex - elements

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- Depreciation
- Energy and material consumptions
  - Power
  - Fuel (450/month)
  - Office supplies
  - Trainings, health and safety courses (30/person)
  - Installing materials
  - Car service (40/month/car)
- Outsourcing
  - Insurance (130)
  - Connection to national Internet (4720/month)
  - Phones (fixed and mobiles)
  - Accounting service (700/month)
  - Rental buildings and towers
  - Sales cost (60/client)
- Taxes
- Personal wages and salaries
- Social insurance
- Others
  - Business trips (200/month/person)
  - Financial costs (interests, payments)
  - Post payment (0,14/month/client)

# Opex in 2007 [PLN]

OPEX	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	2007	
<b>Energy and material consumptions</b>	<b>0</b>	<b>150</b>	<b>2 830</b>	<b>2 860</b>	<b>2 920</b>	<b>2 950</b>	<b>2 980</b>	<b>3 010</b>	<b>3 040</b>	<b>3 070</b>	<b>3 100</b>	<b>3 680</b>		
Power	0	0	30	60	90	120	150	180	210	240	270	300		
Fuel	450		450	450	450	450	450	450	450	450	450	450	900	
Office supplies		150	150	150	150	150	150	150	150	150	150	150	150	
Trainings, health and safety courses	30	0	0	60	60	90	90	90	90	90	90	90	150	
Installing materials		0	0	2 100	2 100	2 100	2 100	2 100	2 100	2 100	2 100	2 100	2 100	
Car service	40		40	40	40	40	40	40	40	40	40	40	80	
<b>Outsourcing</b>		0	0	12 170	12 320	12 520	12 670	12 820	12 970	13 120	13 270	13 420	13 740	
Insurance	130		130	130	130	130	130	130	130	130	130	130	130	
Connection to national Internet	4720		4 720	4 720	4 720	4 720	4 720	4 720	4 720	4 720	4 720	4 720	4 720	
Phones (fixed and mobiles)	100	0	0	100	100	150	150	150	150	150	150	150	250	
Paking	70		70	70	70	70	70	70	70	70	70	70	140	
Accounting service	700		700	700	700	700	700	700	700	700	700	700	700	
Rental buildings and towers		0	0	150	300	450	600	750	900	1 050	1 200	1 350	1 500	
Sales cost	60	0	0	6 300	6 300	6 300	6 300	6 300	6 300	6 300	6 300	6 300	6 300	
<b>Taxes</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Personal wages and salaries</b>		<b>0</b>	<b>0</b>	<b>3 400</b>	<b>3 400</b>	<b>5 100</b>	<b>5 100</b>	<b>5 100</b>	<b>5 100</b>	<b>5 100</b>	<b>5 100</b>	<b>5 100</b>	<b>8 500</b>	
<b>Social insurance</b>		<b>0</b>	<b>0</b>	<b>748</b>	<b>748</b>	<b>1 122</b>	<b>1 122</b>	<b>1 122</b>	<b>1 122</b>	<b>1 122</b>	<b>1 122</b>	<b>1 122</b>	<b>1 870</b>	
<b>Others</b>		<b>0</b>	<b>300</b>	<b>343</b>	<b>802</b>	<b>1 155</b>	<b>1 445</b>	<b>1 731</b>	<b>2 003</b>	<b>2 283</b>	<b>2 569</b>	<b>2 856</b>	<b>3 135</b>	
Business trips	200		200	200	200	200	200	200	200	200	200	200	200	
Interests		0	0	43	487	825	1 101	1 372	1 628	1 892	2 161	2 431	2 693	
Bank payments	100		100	100	100	100	100	100	100	100	100	100	100	
Post payment	0,14	0	0	0	15	29	44	60	75	91	108	125	141	
<b>TOTAL</b>		<b>0</b>	<b>450</b>	<b>19 491</b>	<b>20 130</b>	<b>22 817</b>	<b>23 287</b>	<b>23 753</b>	<b>24 205</b>	<b>24 665</b>	<b>25 131</b>	<b>25 598</b>	<b>30 925</b>	<b>240 452</b>

# Incomes in 2007 [PLN], monthly

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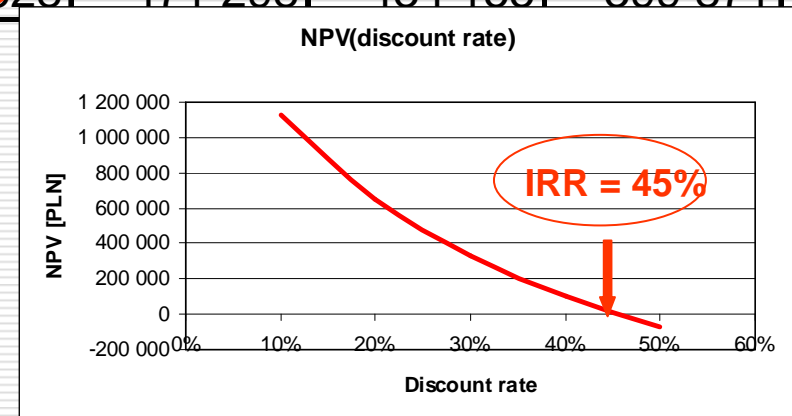
	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Non	Dec	Total
Connections number			105	105	105	110	110	115	120	120	120	120	
Incomes - installation fee class A			1 704	1 704	1 704	1 785	1 785	1 866	1 948	1 948	1 948	1 948	18 340
Incomes - montly fee class A				964	1 928	2 892	3 902	4 911	5 967	7 069	8 170	9 272	45 074
Incomes - installation fee class B			3 360	3 360	3 360	3 520	3 520	3 680	3 840	3 840	3 840	3 840	36 160
Incomes - montly fee class B				3 373	6 747	10 120	13 654	17 188	20 883	24 739	28 594	32 449	157 748
Actual clients number				105	210	315	425	535	650	770	890	1 010	
Total income			5 064	9 401	13 739	18 317	22 861	27 646	32 638	37 595	42 552	47 509	257 322
Accumulated total income			5 064	14 466	28 204	46 522	69 383	97 029	129 667	167 262	209 814	257 322	

- ❑ March – start operation
  - ❑ Total incomes in 2007 = **257 322 PLN**
  - ❑ Client numbers 1010
-

# Results

Year	2007	2008	2009	2010	2011	2012
Clients	1130	770				
Income	257 322	866 602	941 822	941 822	941 822	941 822
Opex	240 452	363 378	322 874	314 525	306 175	297 826
Profit Margin	16 871	503 224	618 949	627 298	635 647	643 996
Capex	893 870	299 530				
CF	-876 999	203 694	618 949	627 298	635 647	643 996
Cumulated CF	-876 999	-673 305	-54 357	572 941	1 208 588	1 852 584
dCF (10%)=	-876 999	185 176	511 528	471 298	434 155	399 871

- NPV (sum of dCF) = **1 125 029**
- IRR = **45%**
- Payback in 4th year



# Comments of the results

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- Project is profitable
  - NPV is positive (project generates money)
  - IRR = 45% is higher than interest of deposit (in Poland less than 10%)
  - Payback in 4th year
- Small firm have a chance to offer broadband access having a good business

# Risk elements

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- Network growth
  - Many administrative procedures (necessary permission for base stations...)
- Number of clients
  - on schedule with plans (influence on incomes)
- Tariffs
  - Price erosion (market liberalization)
- Competition

# Risks analysis

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- ❑ Vulnerability analysis on market changes (our share in), prices, network development
- ❑ SWOT (Strength, Weakness, Opportunities, Threats)
- ❑ Funds
  - Owner capital
  - Dept (credit, loan)

# Summary (1)

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- Idea of designing the wireless business presented
- Described of the elements of the business plan
  - Skipped details
- Case
  - Small company
  - Network for province in Poland
  - Service – Internet access
  - Business plan



# Summary (2)

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- Reached objectives
  - It is possible to establish WLAN business
    - small company
  - Broadband access offer
  - Good economic results of the project
    - IRR 45%
    - Acceptable payback period
    - Positive cash flow