

# DAB+ practical considerations and cost savings – the DAB+ transmitter's perspective

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**ROHDE & SCHWARZ**

# DAB+ and total cost of ownership

## **Total cost of ownership:**

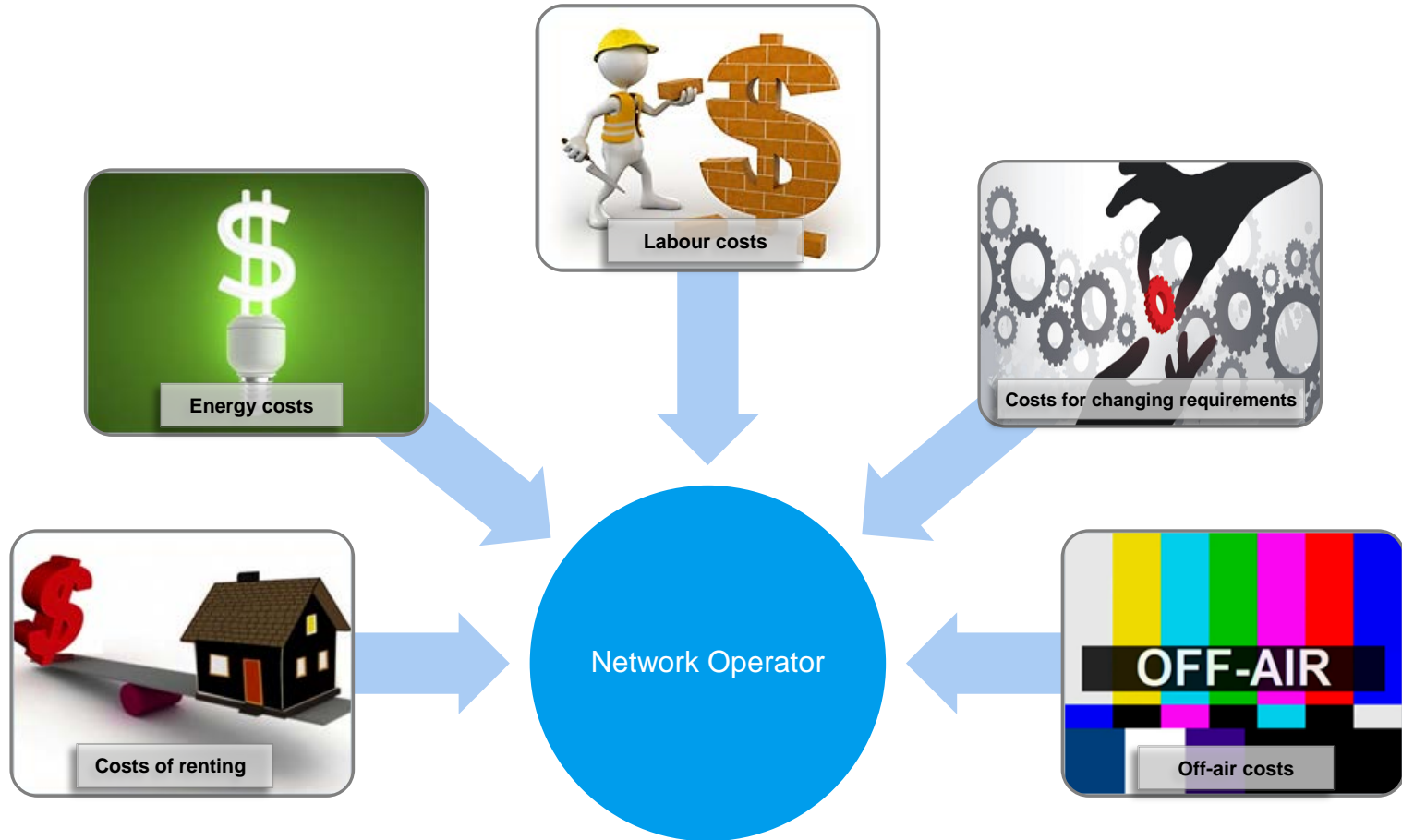
Is the estimate of all direct and indirect costs associated with an asset or acquisition over it's entire life cycle.

(source: [www.businessdictionary.com](http://www.businessdictionary.com))



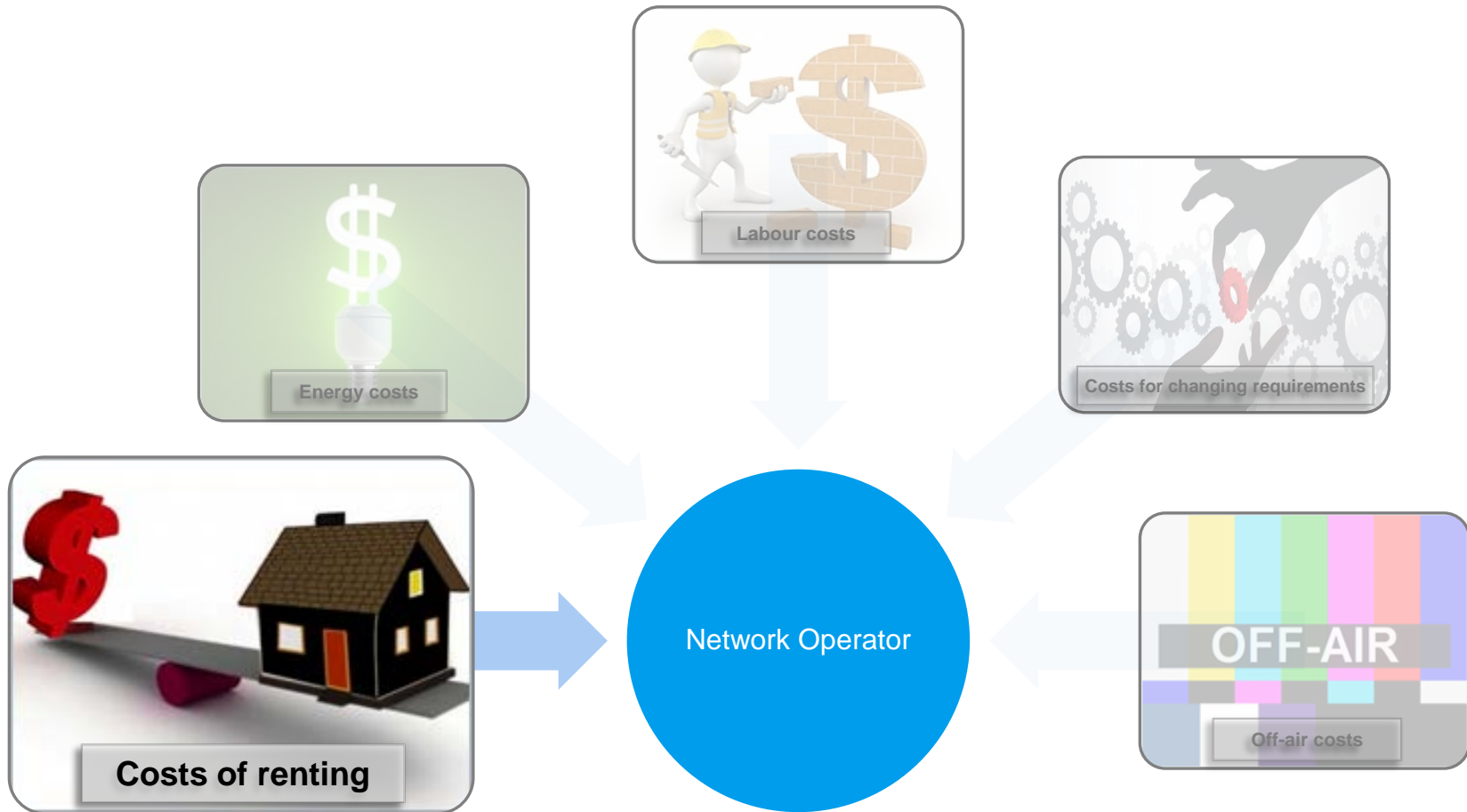
# Total cost of ownership

## Influencing factors other than investment costs



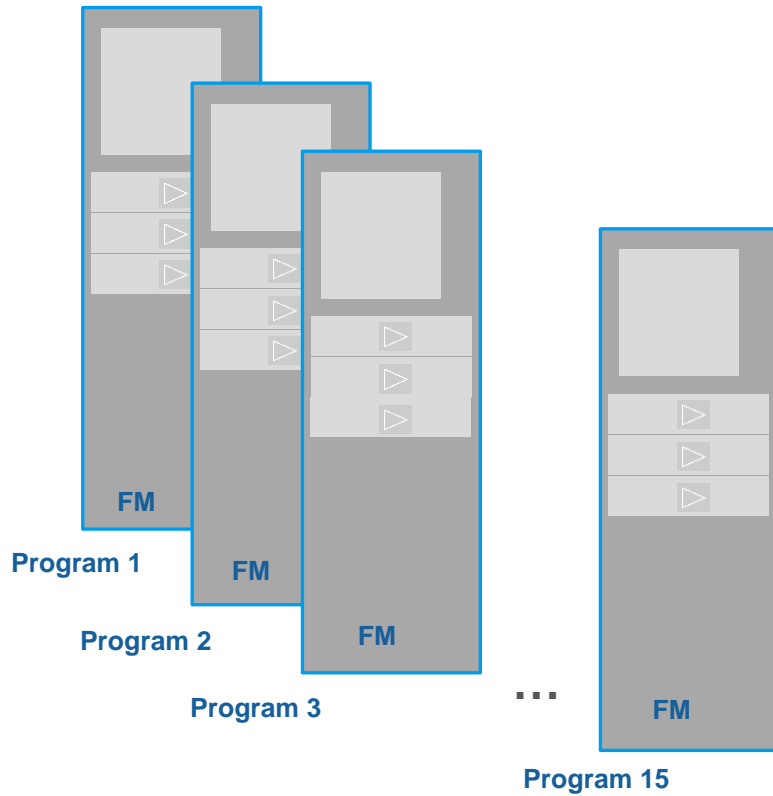
# Total cost of ownership

## Reducing costs of renting

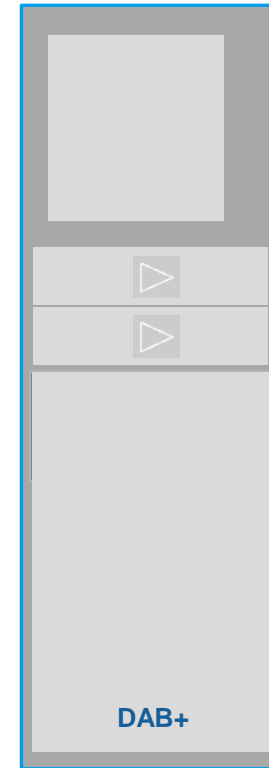


# Reducing costs of renting

## FM vs DAB+



FM – 1 transmitter = 1 program



DAB+ 1 Tx with 15 programs and additional data and services

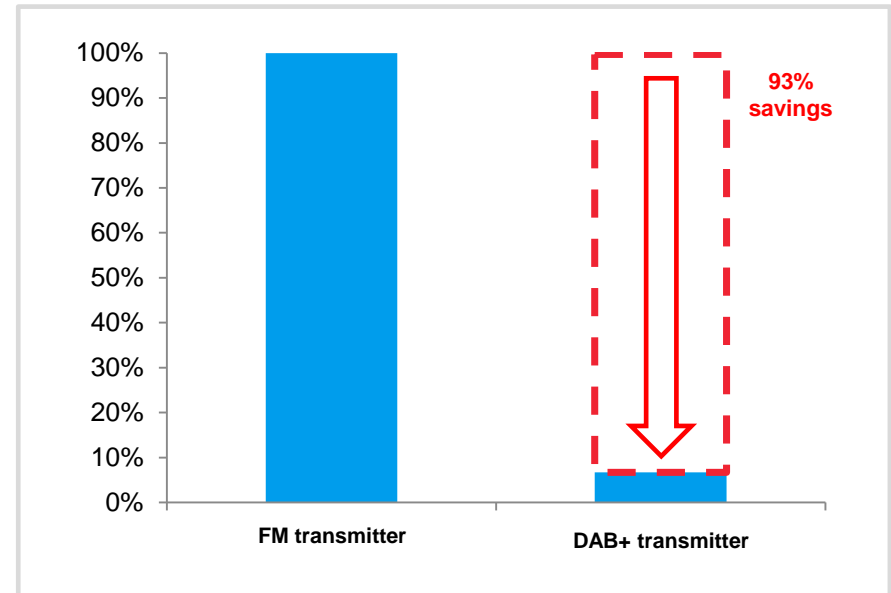


# Reducing costs of renting

## Exemplary calculation with 15 channels



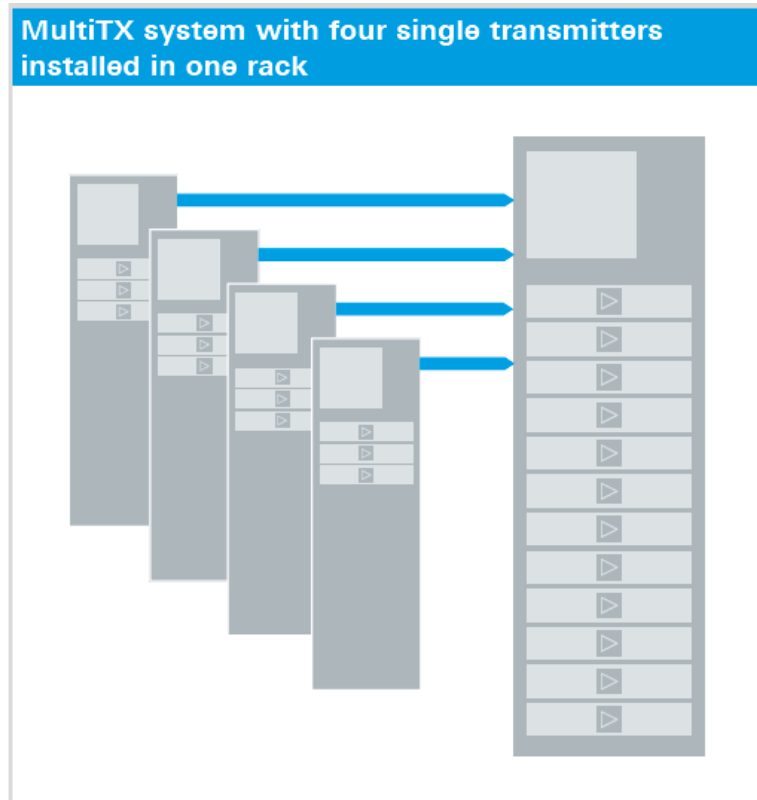
Example calculation – FM transmitter system vs. DAB+ transmitter system		
	15 FM programs	1 DAB Tx
m <sup>2</sup> per system	15 x 1,44	1,44
Ø rental cost transmitter station per m <sup>2</sup> /month	21.6 x 175 €	1.44 x 175 €
Rental cost per year	<b>45.360 €</b>	<b>3.024 €</b>
<b>Saved rental costs in 10 years</b>	<b>423.360 €</b>	



**More than 90% reduction in rental costs / space requirements per year in case of a DAB+ Tx system**

# Reducing costs of renting

## Several transmitters in one rack



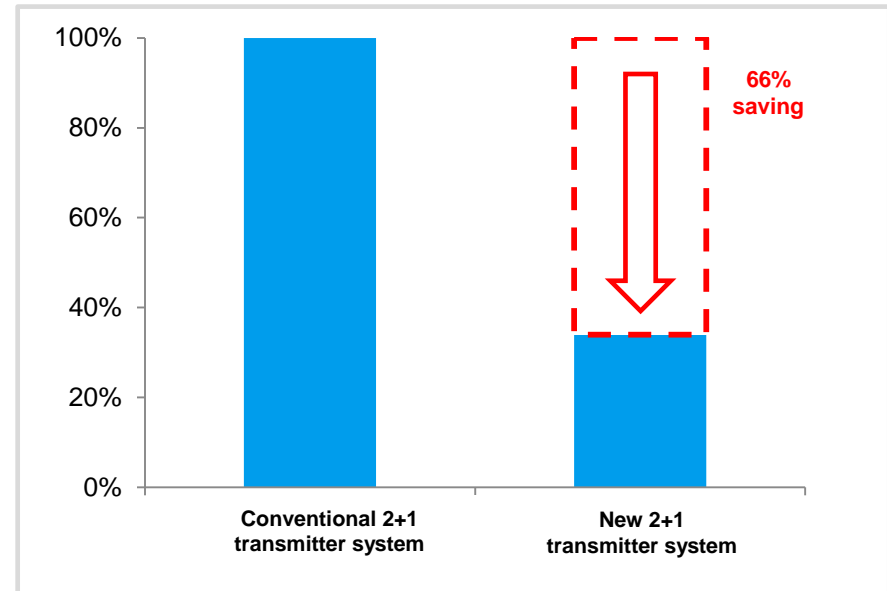
**Space savings by integrating several transmitters in a single rack, e.g. 4x 15 programs in only one rack**

# Reducing costs of renting

## Exemplary calculation 2+1 in single racks vs MultiTX



Example calculation – conventional 2+1 transmitter system vs. new 2+1 transmitter system MultiTx		
	Conventional 2+1 transmitter system	New 2+1 transmitter system
m <sup>2</sup> per system	1,44	0,48
Ø rental cost transmitter station per m <sup>2</sup> /month	175 €	175 €
Rental cost per year	<b>3.024 €</b>	<b>1.008 €</b>
<b>Saved rental costs in 10 years</b>	<b>20.160 €</b>	

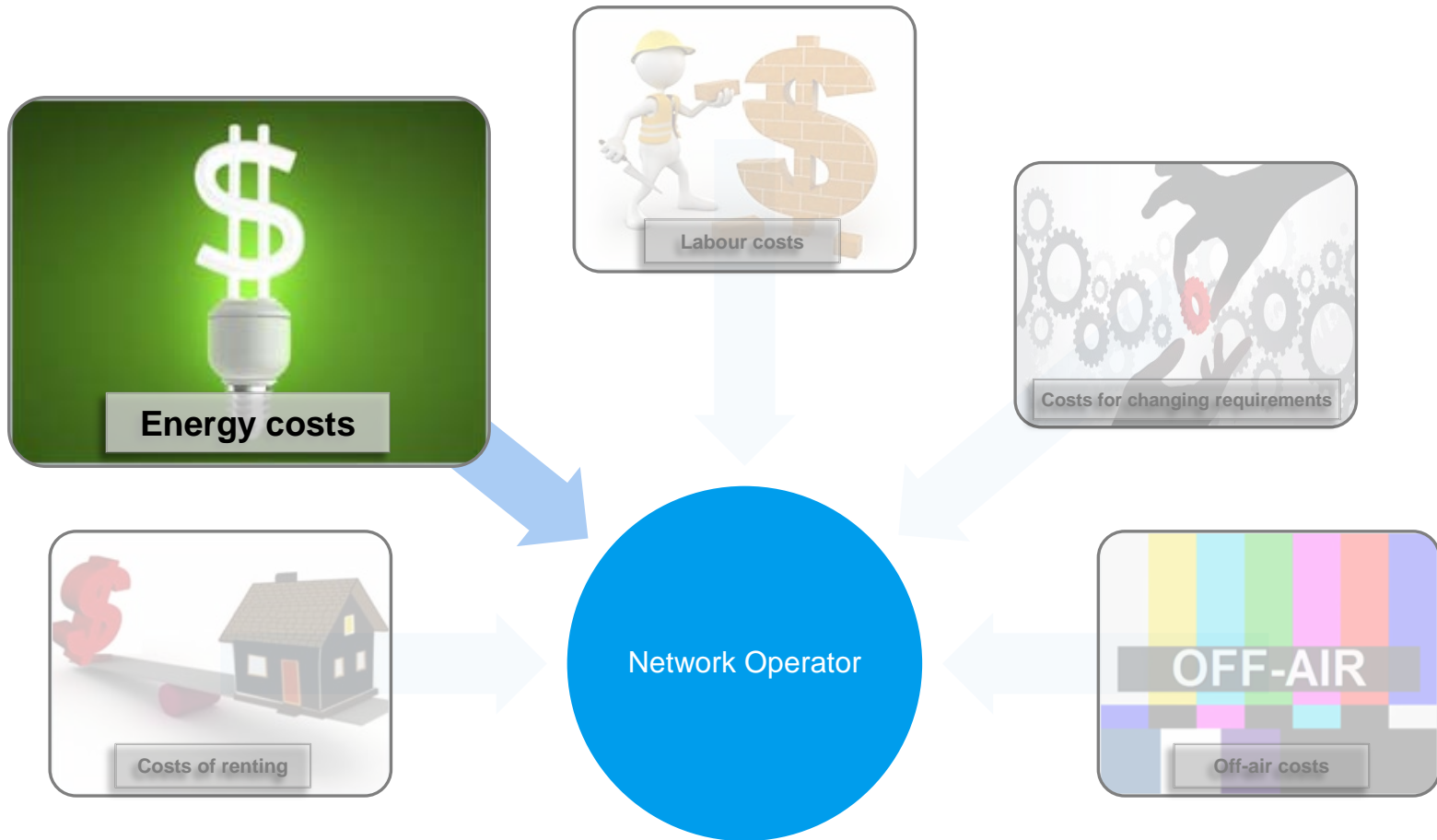


**More than 66% reduction in rental costs per year in case of a 2+1 system integrated in a single rack**



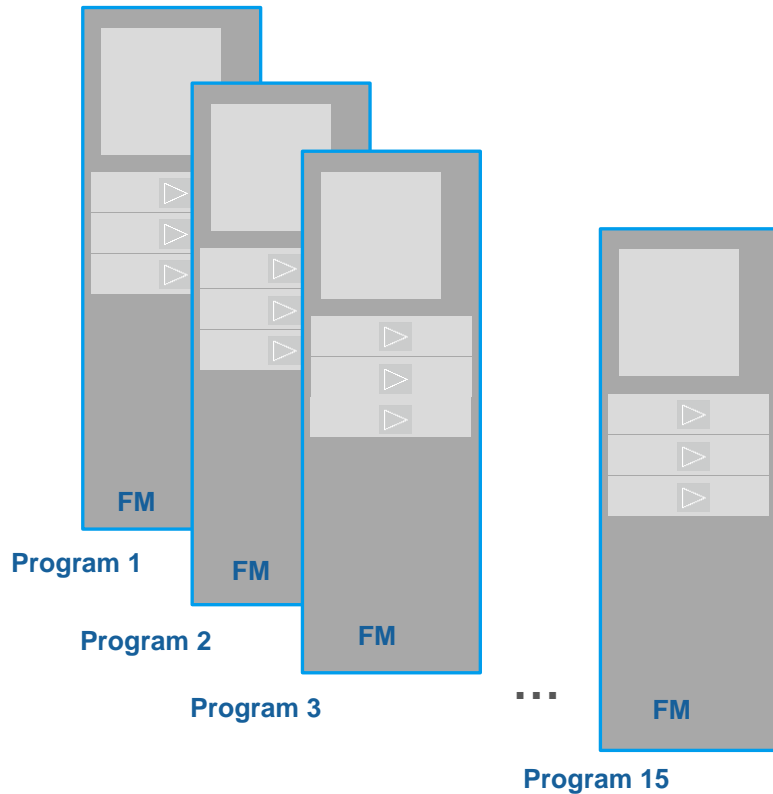
# Total cost of ownership

## Reducing energy costs

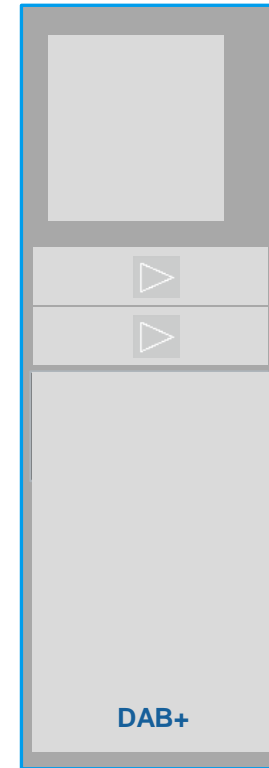


# Reducing energy costs

## 1: FM vs DAB+



FM – 1 transmitter = 1 program



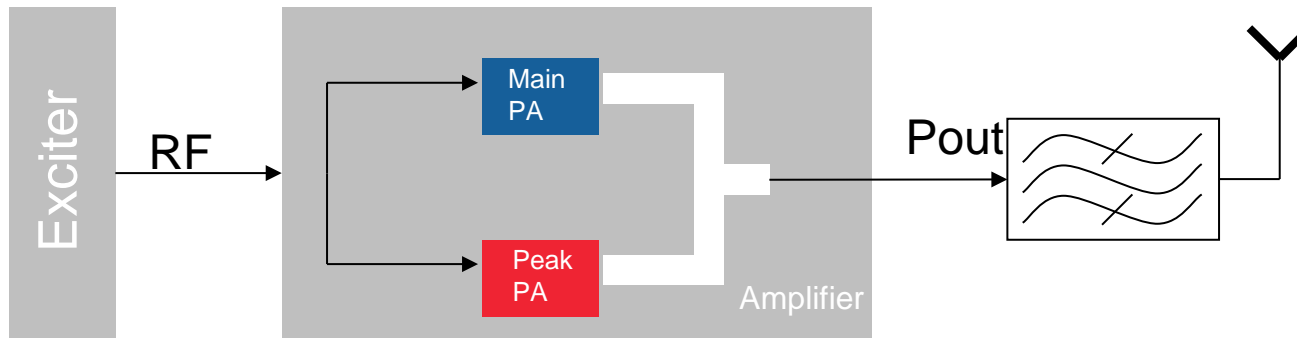
DAB+ 1 Tx with 15 programs and additional data and services



# Reducing energy costs



## 2: Doherty technology in DAB+ power amplifiers



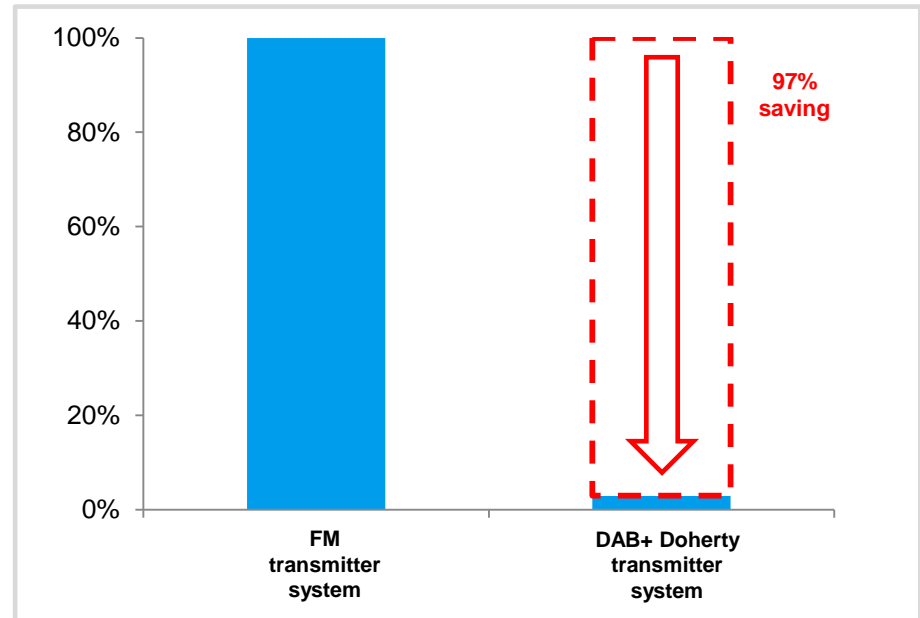
- Amplification for main and peak signals is separated
  - Main amplifier amplifies average signals (class A/B)
  - Peak amplifier amplifies peak signals (class C)
  - lower headroom in main amplifier required
  - No energy required in peak amplifier as long no peaks are in the signal
  - Power efficiency for DAB up to 46%

# Reducing energy costs

## Exemplary calculation with 15 channels



DAB+ transmitter with Doherty technology vs. FM transmitter		
	FM transmitter	DAB+ Doherty technology transmitter
$P_{out}$	5 kW	1.450 W
$P_{in}$	15x 6.76 kW	3.150 W
Power efficiency	<b>74%</b>	<b>46%</b>
Required energy per year (24/7)	888.200 kWh	27.500 kWh
Expected energy costs per kWh	0,12 €	0,12 €
Energy costs per year	<b>106.600 €</b>	<b>3.300 €</b>
<b>Saved energy costs in 10 years</b>	<b>&gt; 1 Mio €</b>	

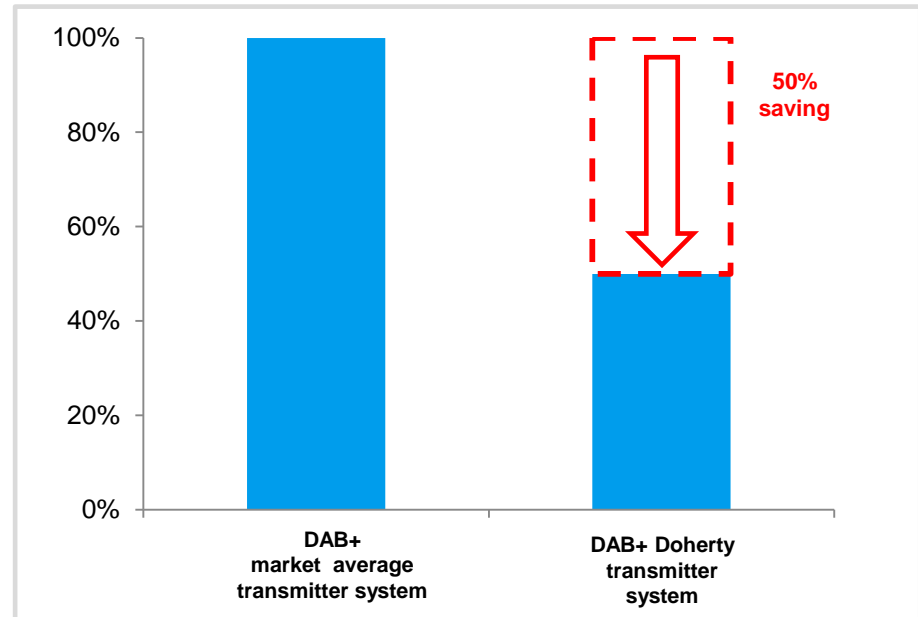


# Reducing energy costs

## Doherty technology vs. standard transmitter

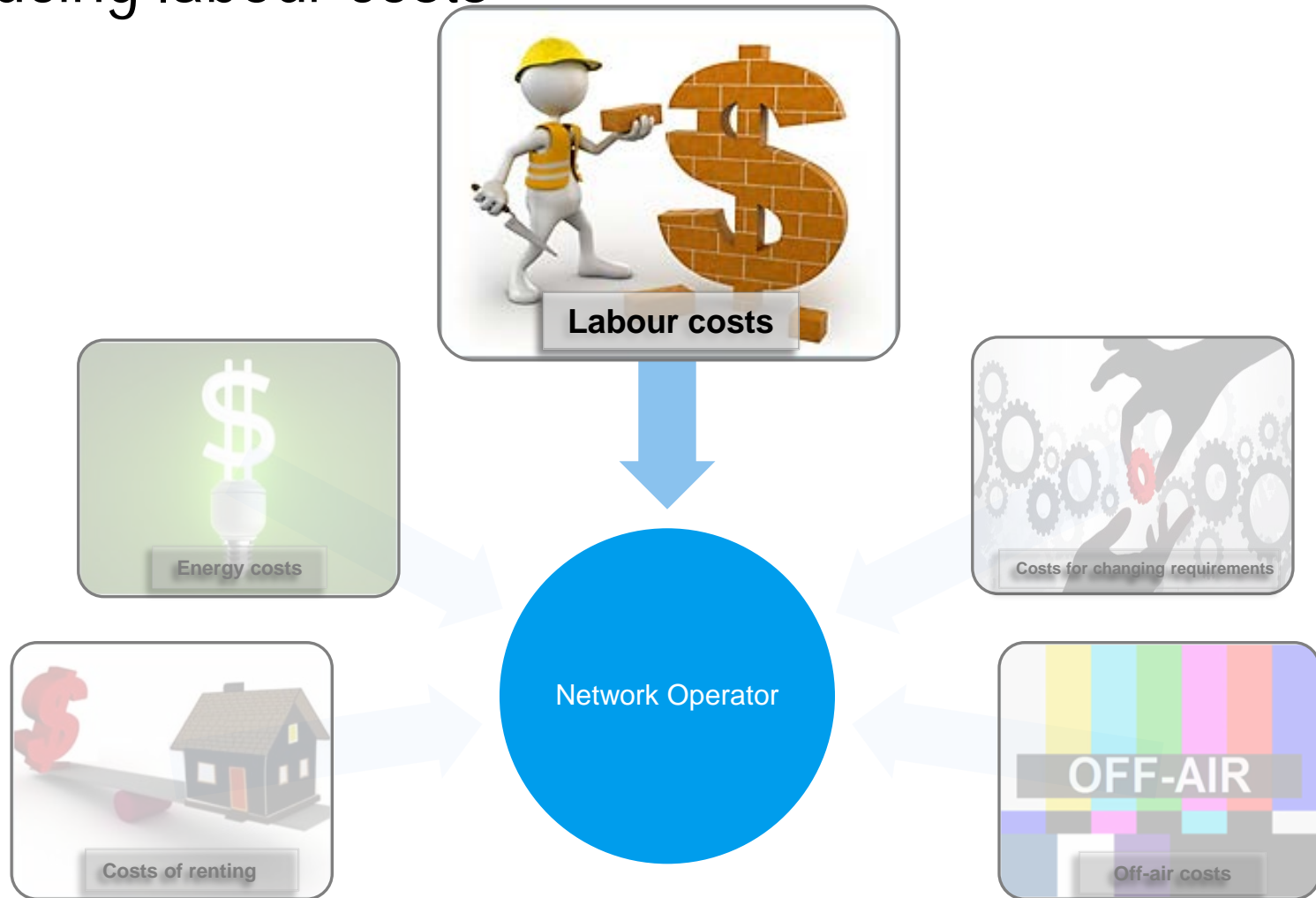


DAB+ transmitter with Doherty technology vs. DAB market average air-cooled transmitter		
	DAB+ market average transmitter	DAB+ Doherty technology transmitter
$P_{out}$	1.450 W	1.450 W
$P_{in}$	6.000 W	3.150 W
Power efficiency	<b>24%</b>	<b>46%</b>
Required energy per year (24/7)	52.500 kWh	27.500 kWh
Expected energy costs per kWh	0,12 €	0,12 €
Energy costs per year	<b>6.300 €</b>	<b>3.300 €</b>
<b>Saved energy costs in 10 years</b>	<b>&gt; 30.000 €</b>	



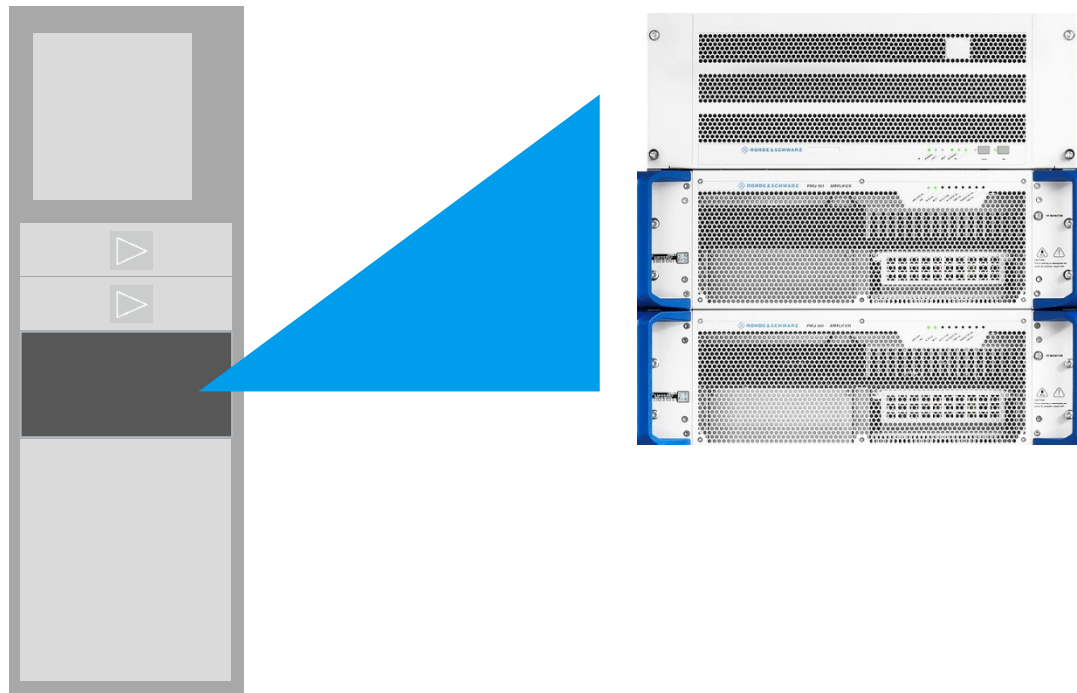
# Total cost of ownership

## Reducing labour costs



# Reducing labour costs

## Compact components for quick installation



**Only one rack for up 6x 15 DAB+ programs allows short installation time**

# Reducing labour costs

## Intelligent diagnostics from remote



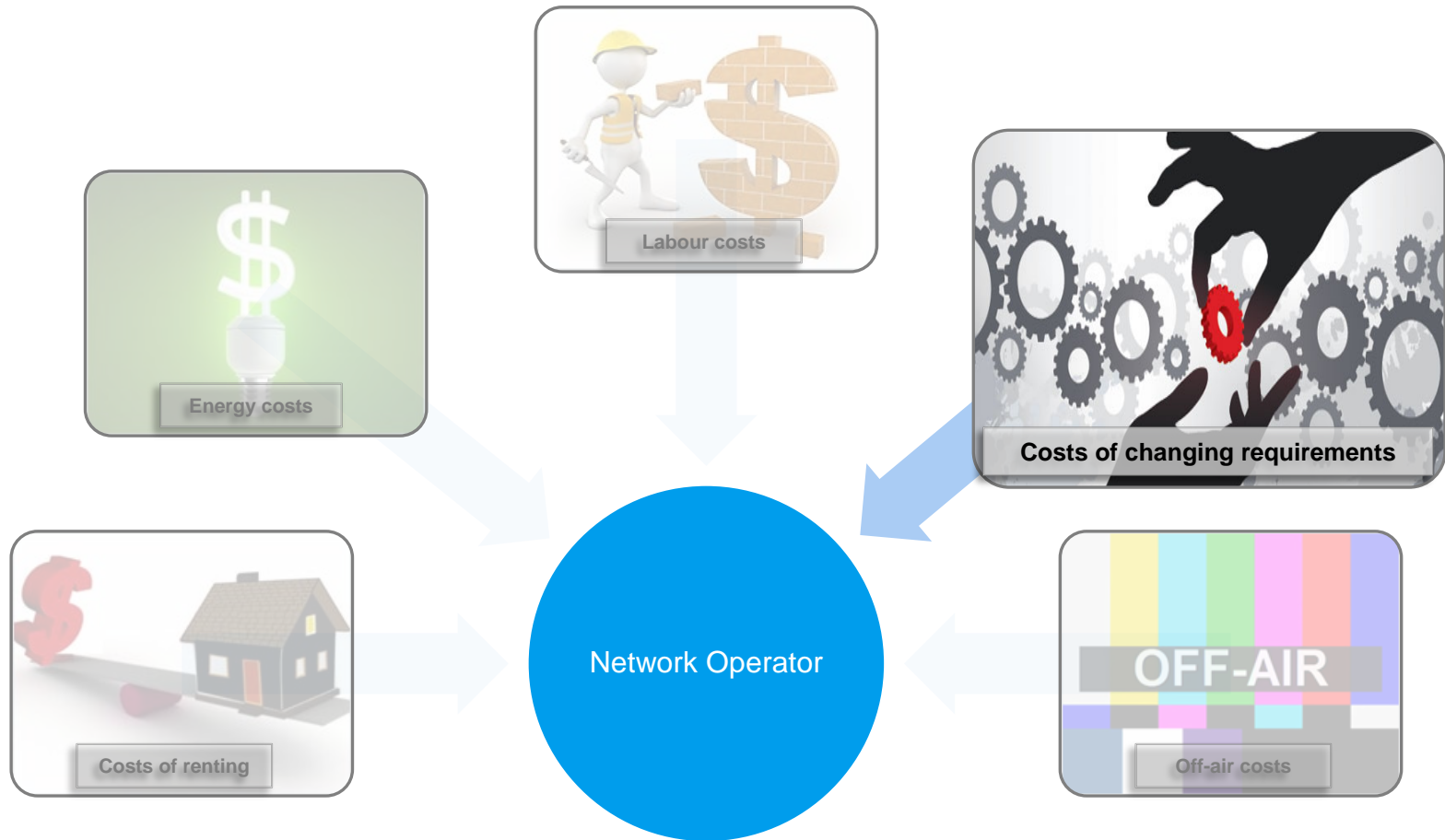
**Is service on site really required?**  
**What kind of service is required?**





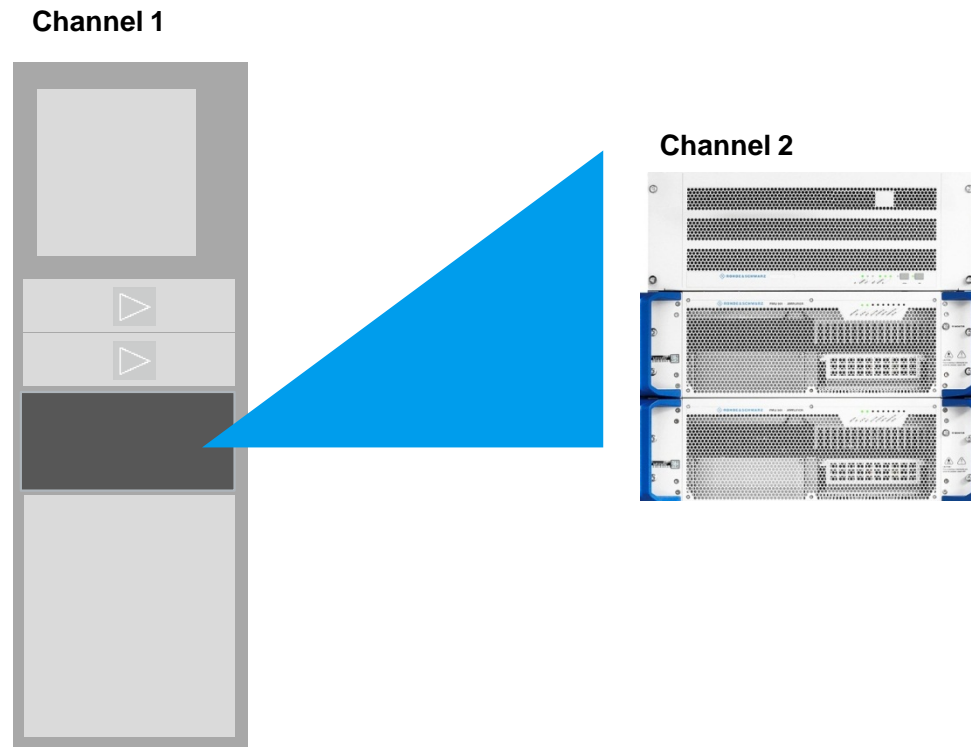
# Total cost of ownership

## Reducing costs for changing requirements



# Reducing costs for changing requirements

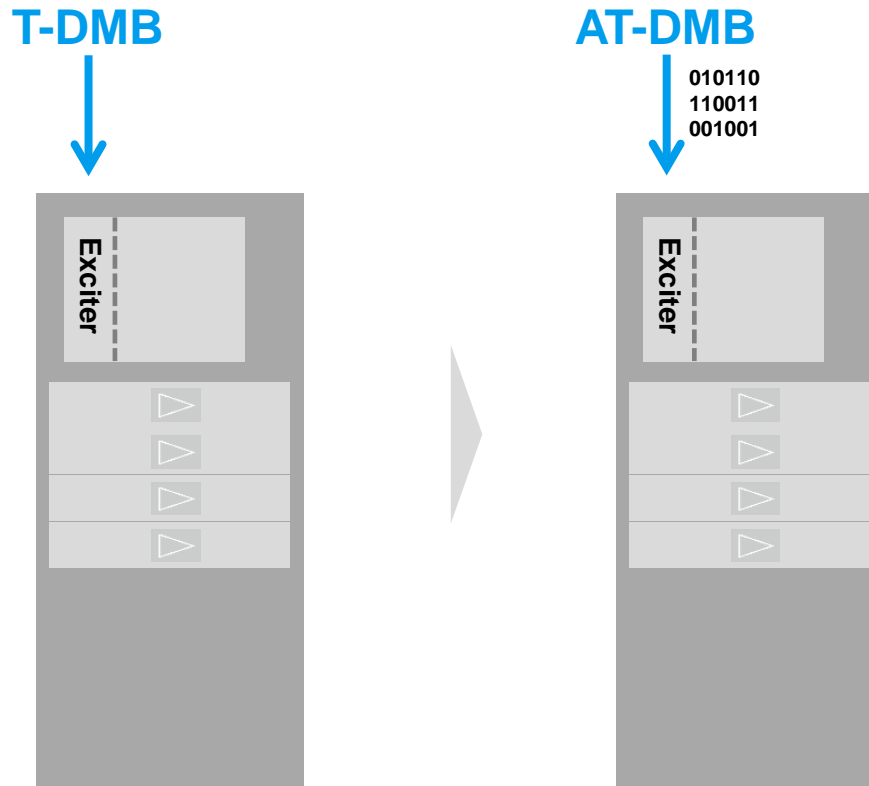
## Modular hardware design



**Easy upgrade to further programs, e.g. starting with a trial of 15 programs and adding 15 more in a later step (low starting costs)**

# Reducing costs for changing requirements

## Modular software design

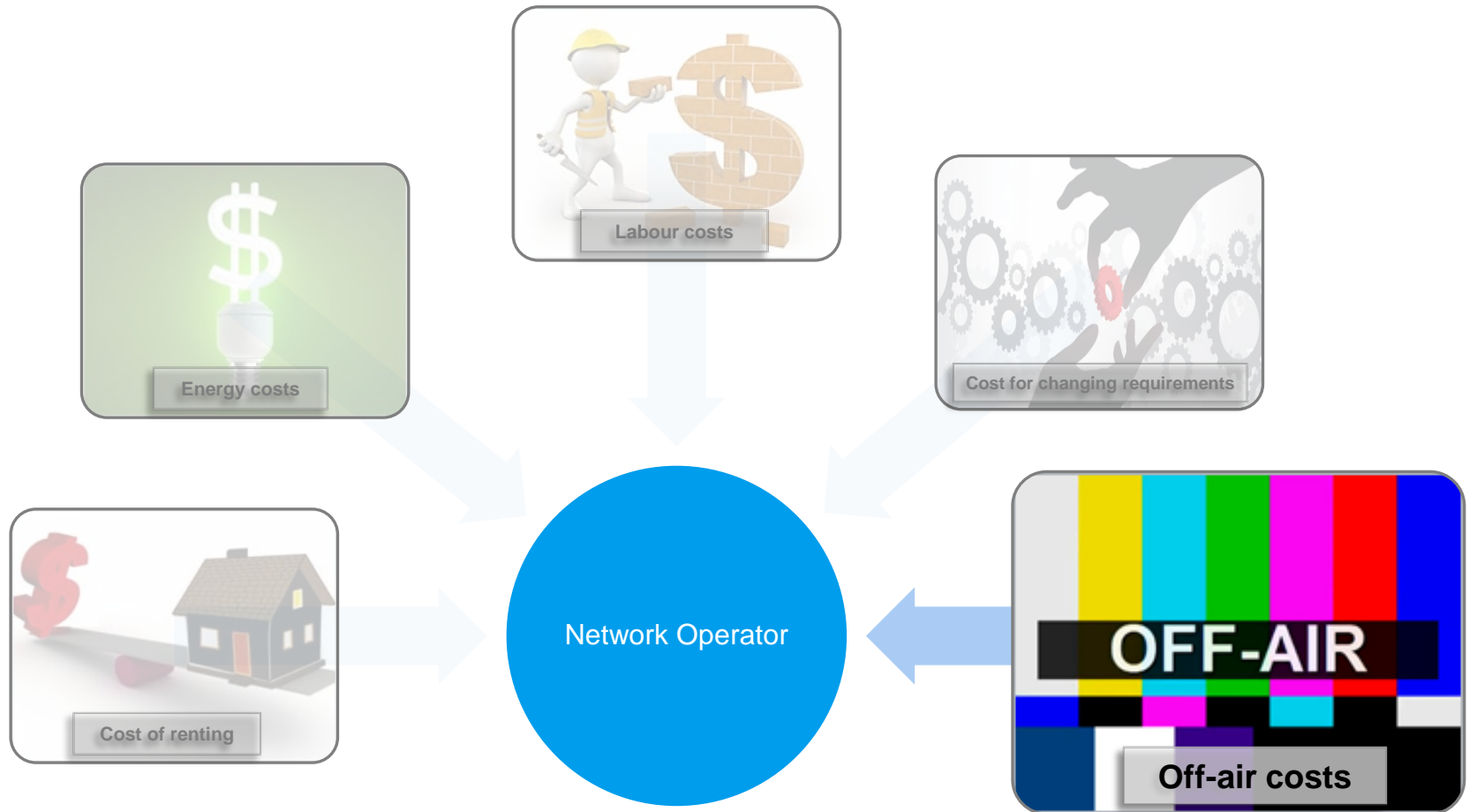


**Software upgradable solutions to new standards and features**



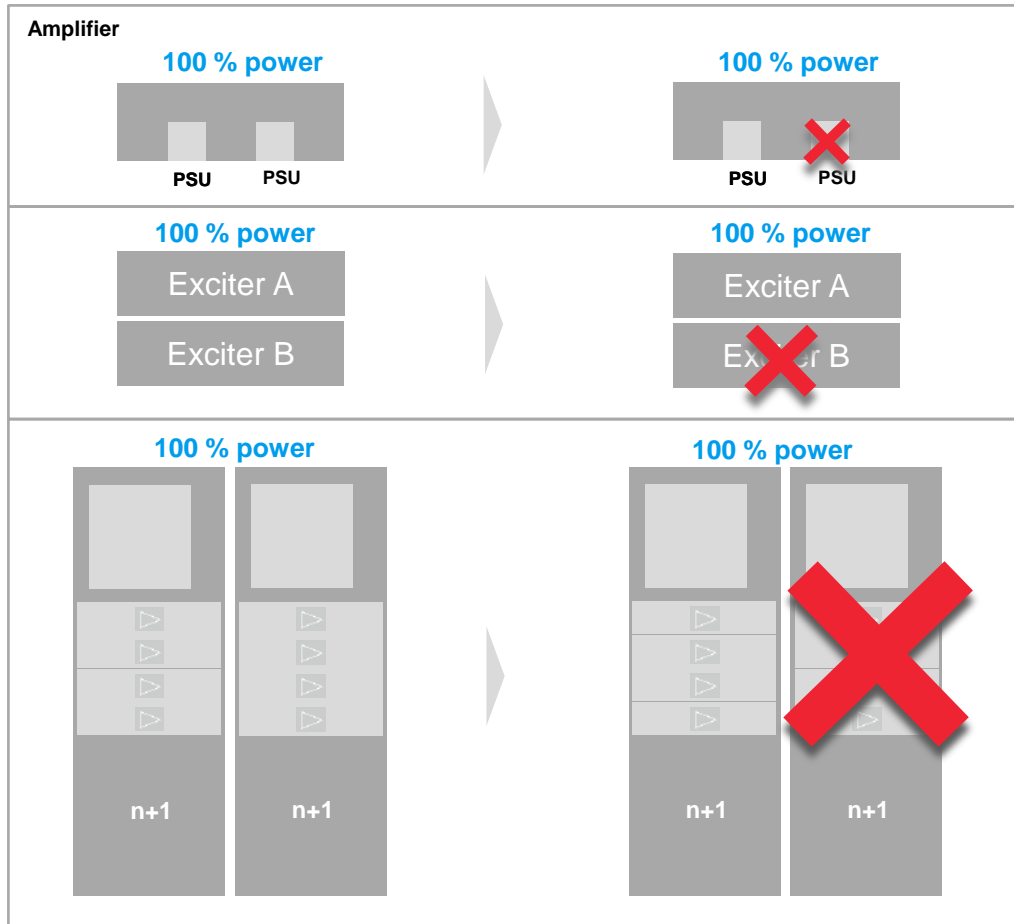
# Total cost of ownership

## Reducing off-air costs



# Reducing costs for off-air time



## Intelligent redundancy solutions

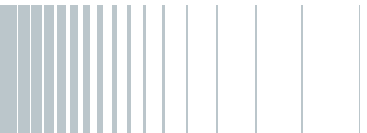


**Redundancy concepts on system and components level**



# Rohde & Schwarz DAB transmitters overview

Medium power	High power
 <p data-bbox="571 933 790 1043"><b>R&amp;S<sup>®</sup>TMV9</b> Air cooled VHF transmitters</p>	 <p data-bbox="1074 933 1338 1043"><b>R&amp;S<sup>®</sup>THV9</b> Liquid cooled VHF transmitters</p>



# QUESTIONS

