



Joint distribution

of Sat-IF and IP signals



SAT

KATHREIN

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Who we are and what we stand for

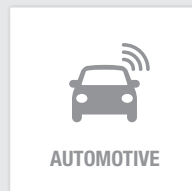
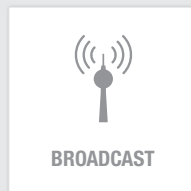
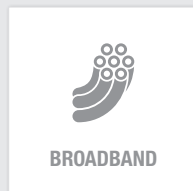
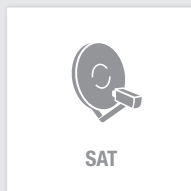
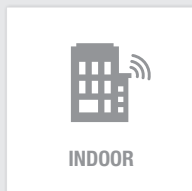
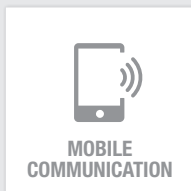
Kathrein is a leading international specialist for reliable, high-quality communication technologies.

We are an innovation and technology leader in today's connected world. Our ability to provide solutions and systems enables people all over the world to communicate, access information and use media, whether at home, at the office or on the road. We cover a broad spectrum: from mobile communication, signal enhancement and

data transmission in buildings, to fibre optic and cable networks and satellite reception technology, to radio and TV transmission and transmission and reception systems in vehicles.

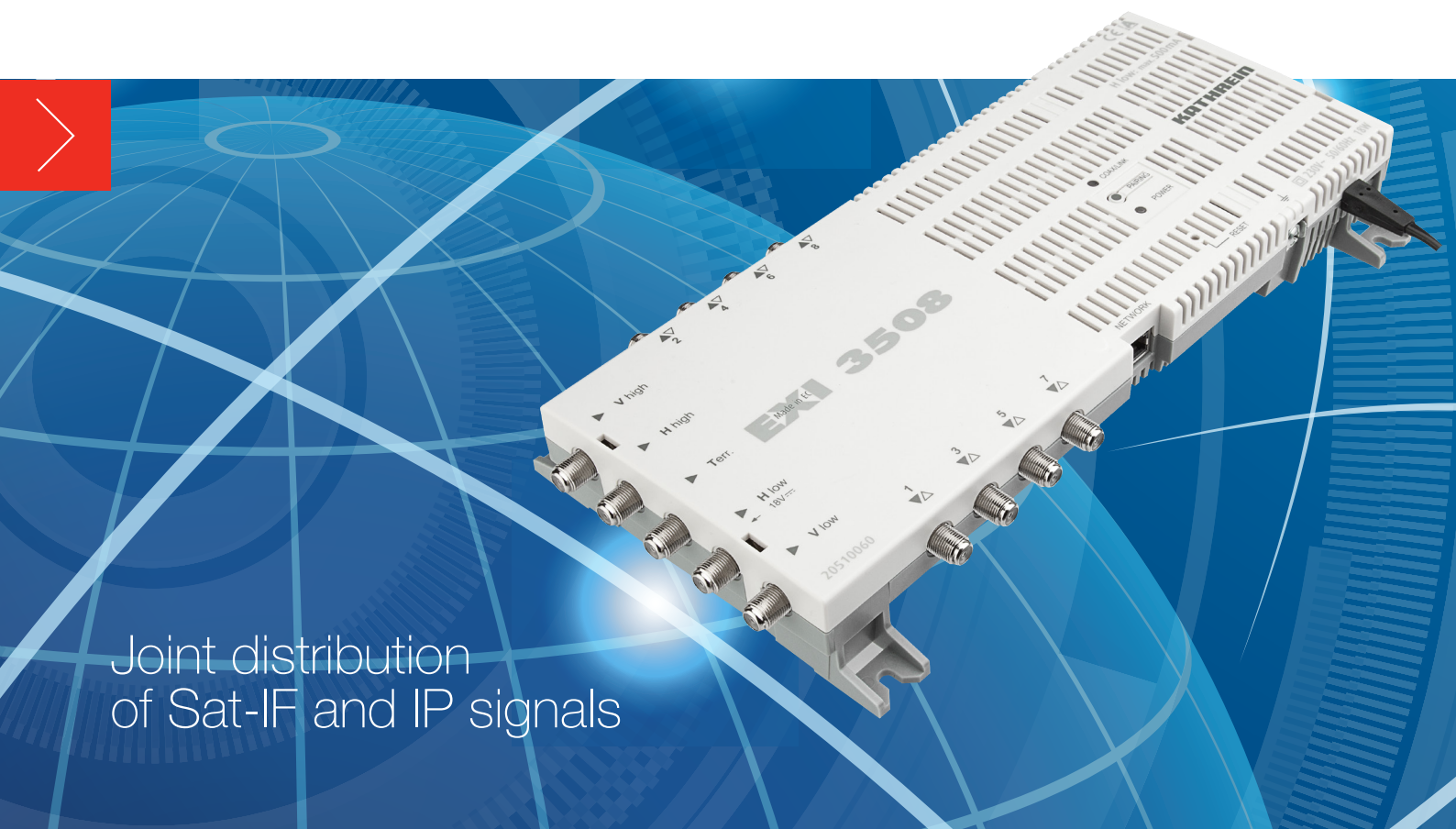
As a hidden champion and family-owned enterprise, we have been working on the technologies of tomorrow since 1919. We take pride in our dedicated employees and our passion for customers and quality.

Our Solutions



Find out more about us at www.kathrein.com

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Joint distribution of Sat-IF and IP signals

What is K-LAN?

Kathrein-LAN products allow you to create a home network using the coaxial cable structure already existing in the house for your satellite reception system. The existing terrestrial distribution system is used to carry IP data packets and traffic.

What does that allow me to do?

The Kathrein LAN system is ideal for the network connection of receivers, TV sets and Blu-ray players. In addition, a PC and other network-capable devices can easily be connected via a router (such as a Fritz!Box).

What advantages does K-LAN offer me?

Using the structure provided by your existing satellite reception system significantly reduces the installation costs – there is no need to pull in new cables. Because of the outstanding transmission characteristics and the high screening factor of the coaxial cables, the IP signals are transmitted without interference – even over ranges up to 700 m.

What will I need?

The EXI 01 modem is necessary to convert back the IP data at the subscriber outlets. If the multi-switch in your satellite reception system is not an EXI 3508, it does not necessarily have to be replaced – but an additional EXI 01 modem will be necessary to feed the IP frequency range from the router into the coaxial cable network. Signal insertion can be carried out at any point in the coaxial distribution system. For optimal performance we recommend the use of the EXI 30 outlet, which has been specially developed for the K-LAN system. This outlet provides the return path range on the satellite connection so that the modem can be remotely fed by the satellite receiver. This greatly simplifies the cabling, as the modem does not require a power supply unit. This also applies to the ESD 84 and ESD 32 outlets. Make sure that all components of the overall terrestrial distribution system (including the outlets used) support the frequency range of 5 to 68 MHz.

Do I need any particular software to set up the system?

No software is required to install the Kathrein-LAN system. Configuration is performed automatically. Kathrein also offers the EXI 700 software for downloading free of charge from "www.kathrein.com". The software displays the visible modems (EXI 01) in a network.

Can my home network be viewed/accessed by others from outside?

The integrated modem within the EXI 3508 multi-switch and the EXI 01 modem are each protected with a factory-set network security key. Additional security is provided by the modems' "pairing" facility, by which the modems agree between themselves a secret network security key. To prevent access and broadcasting in the IP frequency range via any connected terrestrial antenna, an EXI 90 high-pass filter is screwed to the multi-switch at the terrestrial input. The high-pass filter is already incorporated in the EXI 3508 multi-switch. Thus the home network and its outputs are confined to this multi-switch alone, and is not accessible to any external third parties.

Features at a glance

- Data throughput > 500 Mbit
- Uses existing coaxial cable structures
- Easy to install - "Plug and Play"
- Energy-saving mode
- Manufacturer-independent system (the return path must be available)
- High signal security

> Quotation from the "INFOSAT" magazine, issue 10/2012

A secure turbo network

"The Kathrein K-LAN now offers a turbo home networking technology that is well screened against interference, absolutely secure and ... predictably reliable. It is ideally suited to building an extremely high-speed home data network at gross data rates higher than 500 Mbit/s, even over long cable distances."

> EXI 3508 – Multi-switch with integrated modem

All the features at a glance

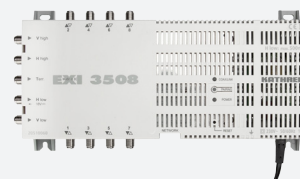
- Cascadable multi-switch with integrated modem for distribution of four satellite polarities and terrestrial signals to up to eight receivers
- Creation of a home network using the existing terrestrial distribution of the multi-switch. The IP data is available at every subscriber outlet. This reduces the cost of installation - no additional network cabling is required
- Integrated highly selective diplexer for the IP data
- The optimised EXI 3508 distribution system allows distances of > 700 m to be achieved in the IP frequency range
- Integrated amplifier ensures low attenuation in the satellite signal band
- Integrated pre-emphasis to equalise cable attenuation
- Terrestrial signals are receivable even with the sat receiver is switched off
- LNB remote feeding via the "horizontal low" input. All other inputs are voltage-free (enabling operation with UAS 585)
- For indoor installation

Integrated modem

- Modem for the Kathrein "K-LAN" IP-over-coax system (based on the IEEE 1901 standard)
- Ideal for the network connection of receivers, TV sets and Blu-ray players. In addition, a PC and other network-capable devices can easily be connected via a router (such as a Fritz!Box)
- > 500 Mbit data throughput (gross) allows transmission of several HD streams with concurrent data transmission between PCs. QoS * allows services to be prioritised as desired
- High screening factor prevents interference
- 128-Bit AES encryption: Secure private network connection at the push of a button - no software required
- Existing outlets can continue to be used, providing they support the frequency range 5-68 MHz. Otherwise the use of the EXI 30 outlet specially developed for "K-LAN" is recommended **). This outlet allows remote feeding (supply) of the modem by the receiver. The IP frequency range is available on the satellite port
- Eco Power Mode: The modem automatically switches to stand-by until it is "woken up" again by the network. Power consumption: 0.5 Watt in stand-by/4.2 Watt in operation

MAIN FEATURES

- Cascadable
- Distribution of four satellite polarities
- Up to eight receivers



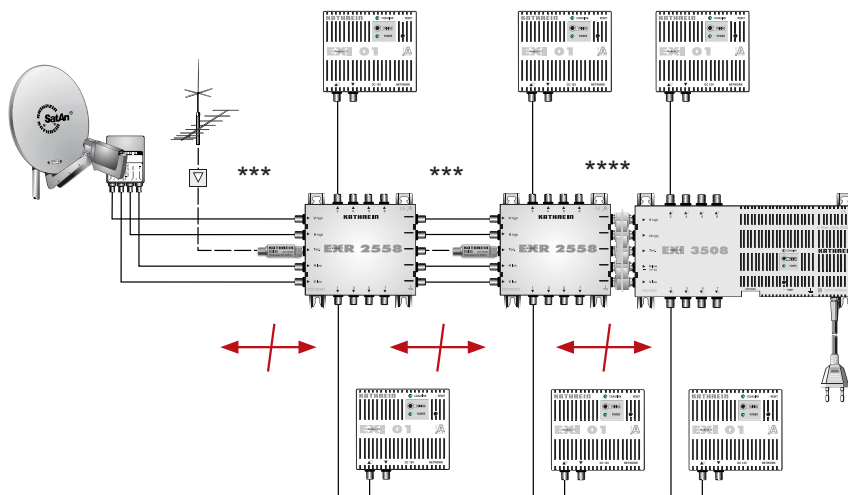
EXI 3508

* Quality of Service

** Alternatively the ESD 84 and ESD 32 outlets can also be used

Accessories

- EXI 30 (Order no. 21110024): Outlet remotely fed via the satellite outlet, with optimal selection for data and RF signals
- Single modem EXI 01 (Order no. 20510061): To re-convert IP data at the subscriber outlets (to connect a satellite receiver with an Ethernet interface)
- EXI 700 software: Displays the visible modems in a network (free download from: www.kathrein.com)
- EXI 90 high-pass filter (Order no. 20510062): If other multi-switches (not from the EXI range) are cascaded and if the EXI 01 is operated through one of these multi-switches, the high-pass filter must be screwed to the terrestrial input of the multi-switch. This isolates the downstream multi-switch in the cascade and prevents reception and emission in the IP frequency range by and from the terrestrial antenna. The high-pass filter is already incorporated in the EXI 3508



*** Separation of the IP frequency range by and from the terrestrial antenna and other downstream multi-switches is performed by the screwed-on EXI 90 high-pass filter

**** Separation of the IP frequency range by and from the terrestrial antenna and other downstream multi-switches is performed here by the integral high-pass filter within the EXI 3508

> EXI 3591 – Single-cable multi-switch with integrated modem

All the features at a glance

- Cascadable single-cable multi-switch with integrated modem for distribution of Sat-IF signals (four Sat planes) and terrestrial signals via a single-cable to up to nine receivers
- The selected transponder is pre-set by the multi-switch to a fixed frequency (user band), controlled by the receiver using a DiSEqC™ command set according to EN 50494
- The multi-switch supports the extended SCD2 single-cable command set according to EN 50607
- The EN 50607 extended command set allows all user bands to be addressed, whereas the standard EN 50494 allows only user band 1-8 to be addressed
- Terrestrial signals can be received even when the satellite receiver is switched off
- Each receiver is assigned a fixed subscriber frequency (user band) (a twin receiver requires two subscriber frequencies)
- Creation of a home network using the existing terrestrial distribution system. The IP data are available at the subscriber outlet. This reduces the cost of installation - no additional network cabling is required
- PIN code: This protects the subscriber frequency against access by other subscribers. This enables installation across more than one apartment
- The integrated AGC (Automatic Gain Control) ensures that the Sat-IF signals have a constant output voltage
- Integrated highly selective diplexer for the IP data
- Low power consumption due to highly efficient short-circuit-proof switched-mode power supply unit which fulfils the ERP guidelines and power-saving concept (the single-cable multi-switch is switched off when the receiver is switched off)
- Kathrein Power-Saving: The LNB power feed is switched off as soon as there are no longer any receivers active. This function can be deactivated if loop-through multi-switches without Kathrein Power-Saving are used in the cascade
- LNB remote feeding via the "horizontal low" input. Kathrein Power-Saving is signalled via the "vertical low" trunk. All other inputs are voltage-free
- For indoor installation

MAIN FEATURES

- Single cable multi-switch
- Cascadable
- Distribution of four satellite frequency polarities
- Up to nine receivers



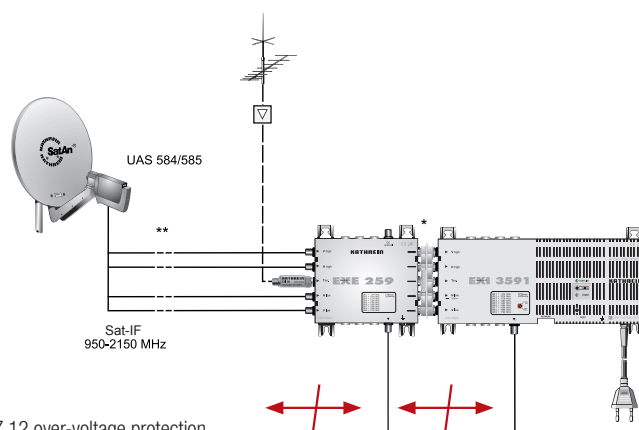
EXI 3591

Integrated modem

- Modem for the Kathrein "K-LAN" IP-over-coax system (based on the IEEE 1901 standard)
- Ideal for the network connection of receivers, TV sets and Blu-ray players. In addition, a PC and other network-capable devices can easily be connected via a router (such as a Fritz!Box)
- > 500 Mbit data throughput (gross) allows transmission of several HD streams with concurrent data transmission between PCs. QoS * allows services to be prioritised as desired
- High screening factor prevents interference
- 128-Bit AES encryption. Secure private network connection at the push of a button - no software required
- Eco Power Mode: The modem automatically switches to stand-by until it is "woken up" again by the network. Power consumption: 1.0 Watt in stand-by/4.2 Watt in operation

Accessories

- EXI 30 (Order no. 21110024): Outlet remotely fed from the satellite outlet, with optimum selection for data and RF signals
- Single modem EXI 01 (Order no. 20510061): To re-convert IP data at the subscriber outlets (to connect a satellite receiver with an Ethernet interface)
- EXI 700 software: Displays the visible modems in a network (free download from: www.kathrein.com)
- EXI 90 high-pass filter (Order no. 20510062): If other multi-switches (not from the EXI range) are cascaded and if the EXI 01 is operated through one of these multi-switches, the high-pass filter must be screwed to the terrestrial input of the multi-switch. This isolates the downstream multi-switch in the cascade and prevents reception and emission in the IP frequency range by and from the terrestrial antenna. The high-pass filter is already incorporated in the EXI 3591



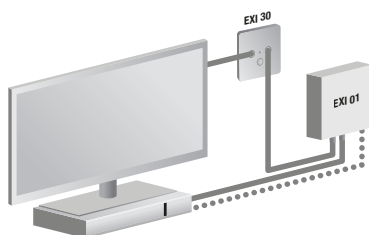
** KAZ 11/KAZ 12 over-voltage protection

> EXI 01 modem

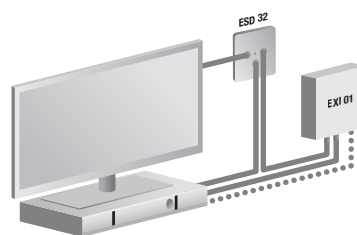
All the features at a glance

- Modem for the Kathrein "K-LAN" IP-over-coax system (based on the IEEE 1901 standard)
- Creation of a home network over the existing terrestrial coax distribution for the satellite system. This reduces the cost of installation - no additional network cabling is required
- Ideal for the network connection of receivers, TV sets and Blu-ray players. In addition, a PC and other network-capable devices can easily be connected via a router (such as a Fritz!Box)
- > 500 Mbit data throughput (gross) allows transmission of several HD streams with concurrent data transmission between PCs. QoS * allows services to be prioritised as desired
- Integrated highly selective diplexer - no interference between FM, TV and satellite signals. No additional splitters are necessary
- High screening factor prevents interference
- One input (IP & Sat/TV/FM); one output (1 x FM/TV/Sat);
1 x Ethernet RJ 45. DC is looped through
- 128-Bit AES encryption: Secure private network connection at the push of a button - no software required
- In conjunction with the optimised EXI 3508 distribution system, distances of > 700 m are achievable in the IP frequency range
- The modem can be remotely fed by the connected satellite receiver, using the port on the EXI 30 outlet. In all other cases the power is supplied by the plug-in power supply unit. The EXI 30 outlet has been specially developed for K-LAN **
- Eco Power Mode: The modem automatically switches to stand-by until it is "woken up" again by the network. Power consumption: 0.5 Watt in stand-by/4.2 Watt in operation
- For indoor installation
- Scope of delivery: EXI 01, plug-in power supply unit and network cable (length: 1.5 m with RJ 45 plug)

Connection examples



Remote feeding of the modem via the receiver



Connection example for a twin receiver,
remote feeding of the modem via the receiver

MAIN FEATURES

- For the Kathrein IP-over-coax system
- Reduced cost of installation



EXI 01



* Quality of Service

** Alternatively the ESD 84 and ESD 32 outlets can also be used

Accessories

> EXI 30 – Satellite end outlet box, 3 port

For tree and branch and star-wired distribution systems in satellite house distribution systems. Outlet remotely fed from the satellite outlet, with optimal selection for data and RF signals. Optimised for use of the Kathrein K-LAN home networking technology with EXI 01 and EXI 3508.



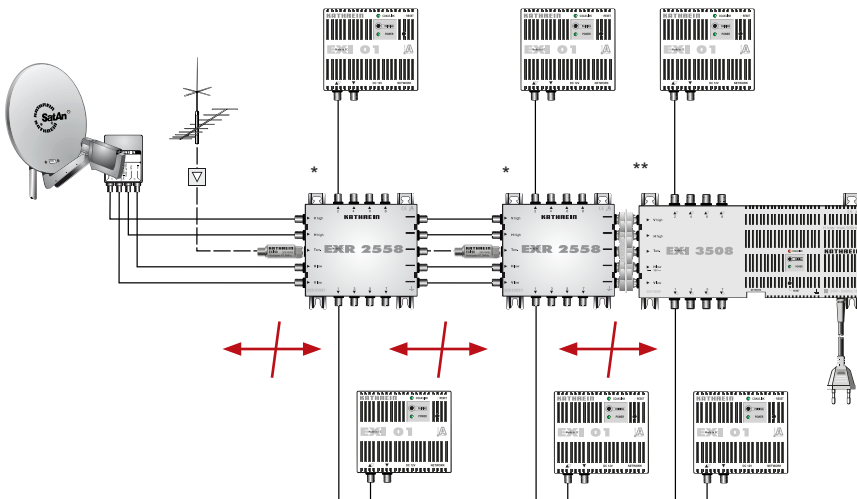
EXI 30

> EXI 90 – High-pass filter

If other multi-switches (not from the EXI range) are cascaded and if the EXI 01 is operated from one of these multi-switches, the high-pass filter must be screwed to the terrestrial input of the multi-switch. This isolates the downstream multi-switch in the cascade and prevents reception and emission in the IP frequency range by and from the terrestrial antenna. The high-pass filter is already incorporated in the EXI 3508.



EXI 90



- * Separation of the IP frequency range from and to the terrestrial antenna and other downstream multi-switches is performed by the screwed-on EXI 90 high-pass filter
- ** Separation of the IP frequency range from and to the terrestrial antenna and other downstream multi-switches is performed here by the integral high-pass filter within the EXI 3508

> EXI 700 – Software

Displays the visible modems (EXI 01) in a network. The software can be downloaded free of charge from "www.kathrein.com".

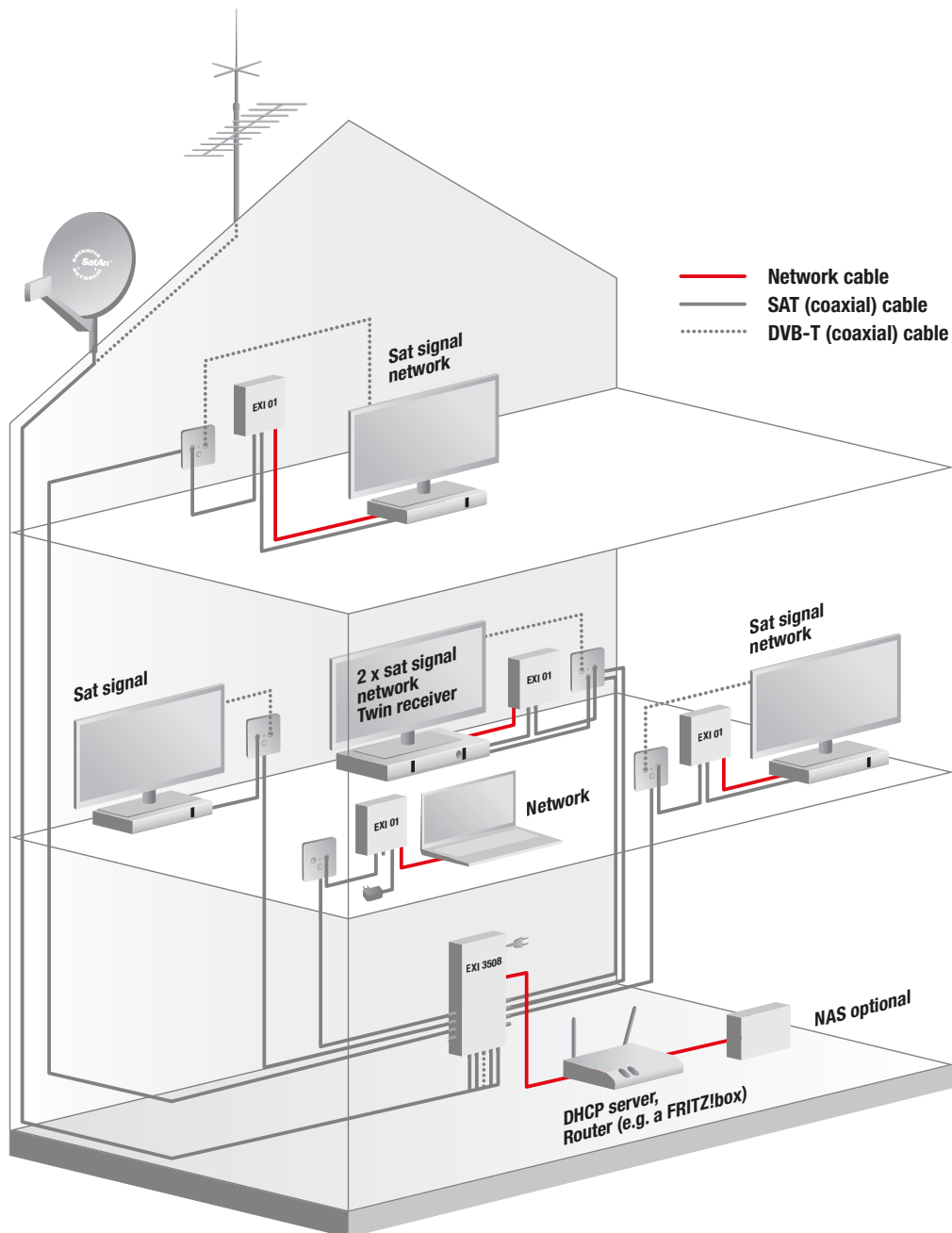


EXI 700

Configuration examples

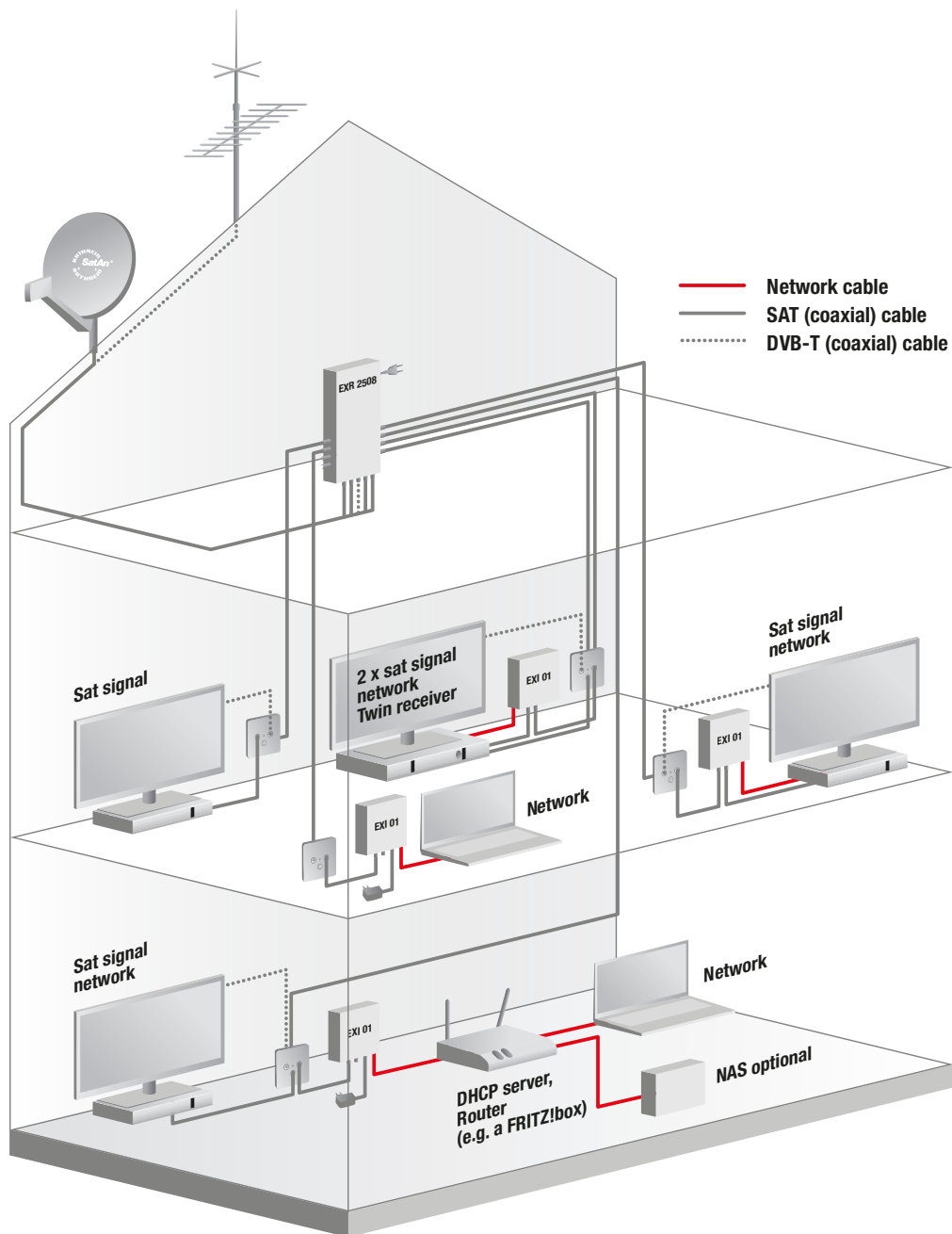
EXAMPLE 1:

Feeding into the network/Internet via a DHCP server/
router on the EXI 3508 in the cellar (e.g. the metering
cupboard).



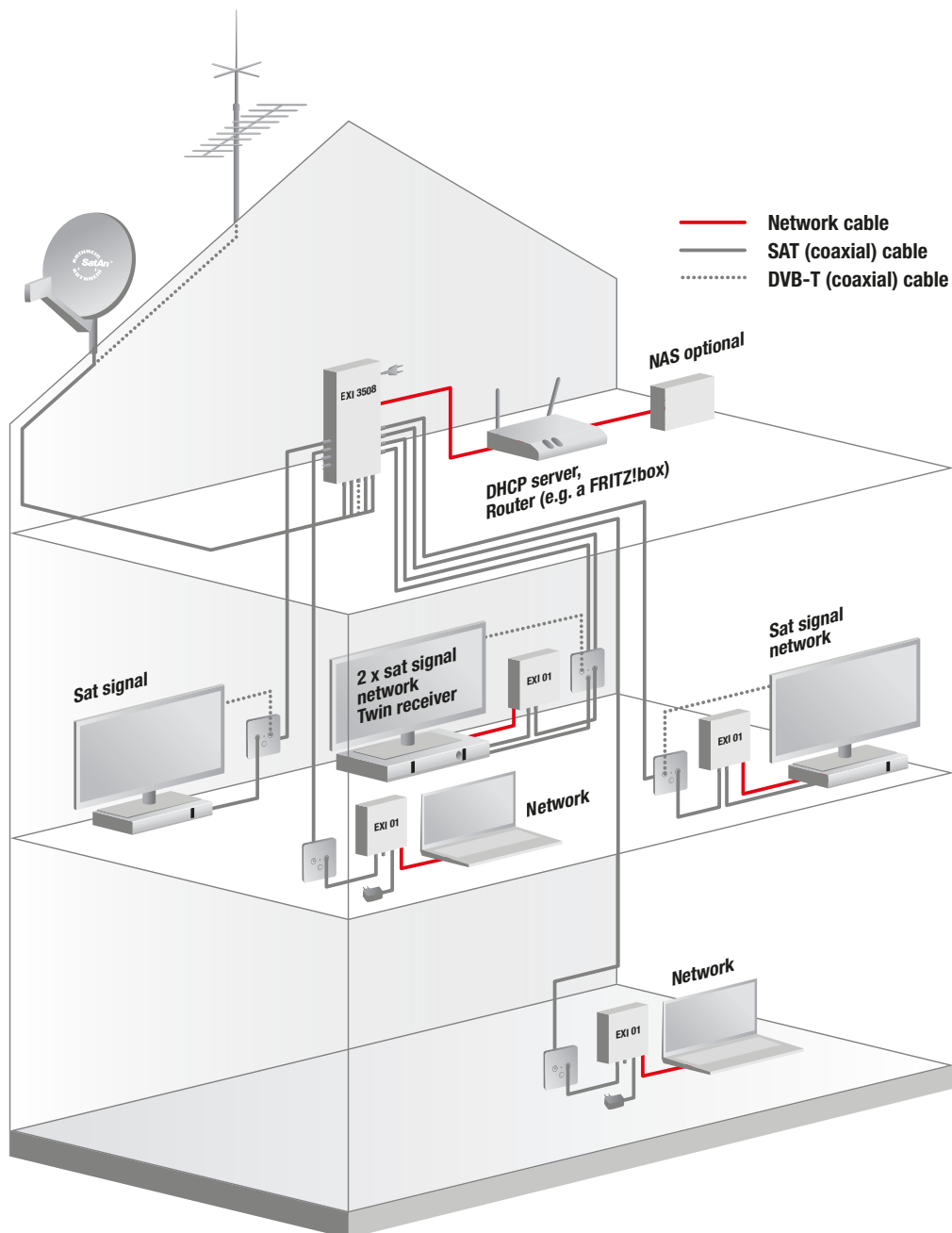
EXAMPLE 2:

Feeding into the network/Internet via a DHCP server/
router on an EXI 01 in the cellar or office.



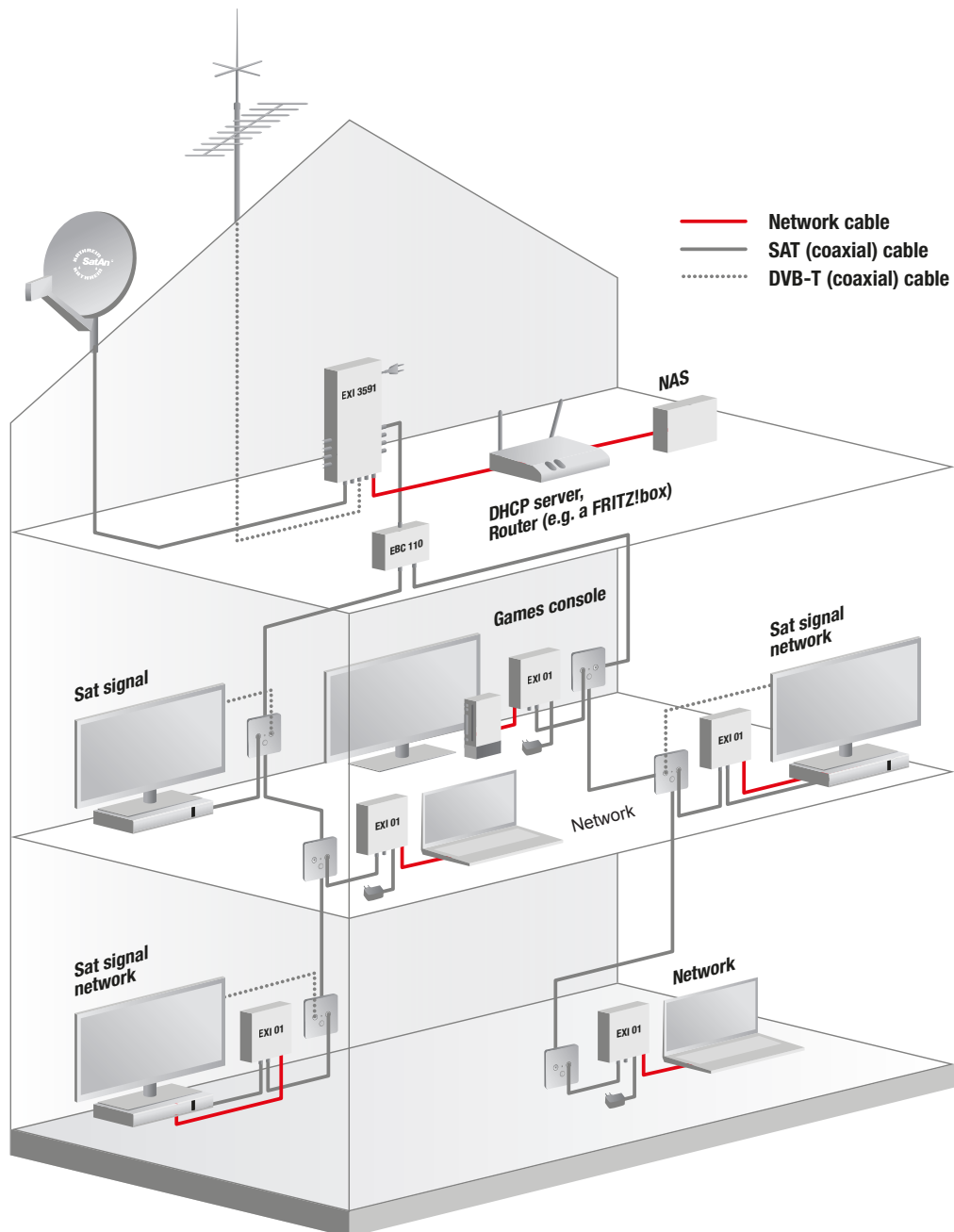
EXAMPLE 3:

Feeding into the network/Internet via a DHCP server/
router on the EXI 3508 in the attic.



EXAMPLE 4:

Feeding into the network/Internet via a DHCP server/
router on the EXI 3591 in the attic.



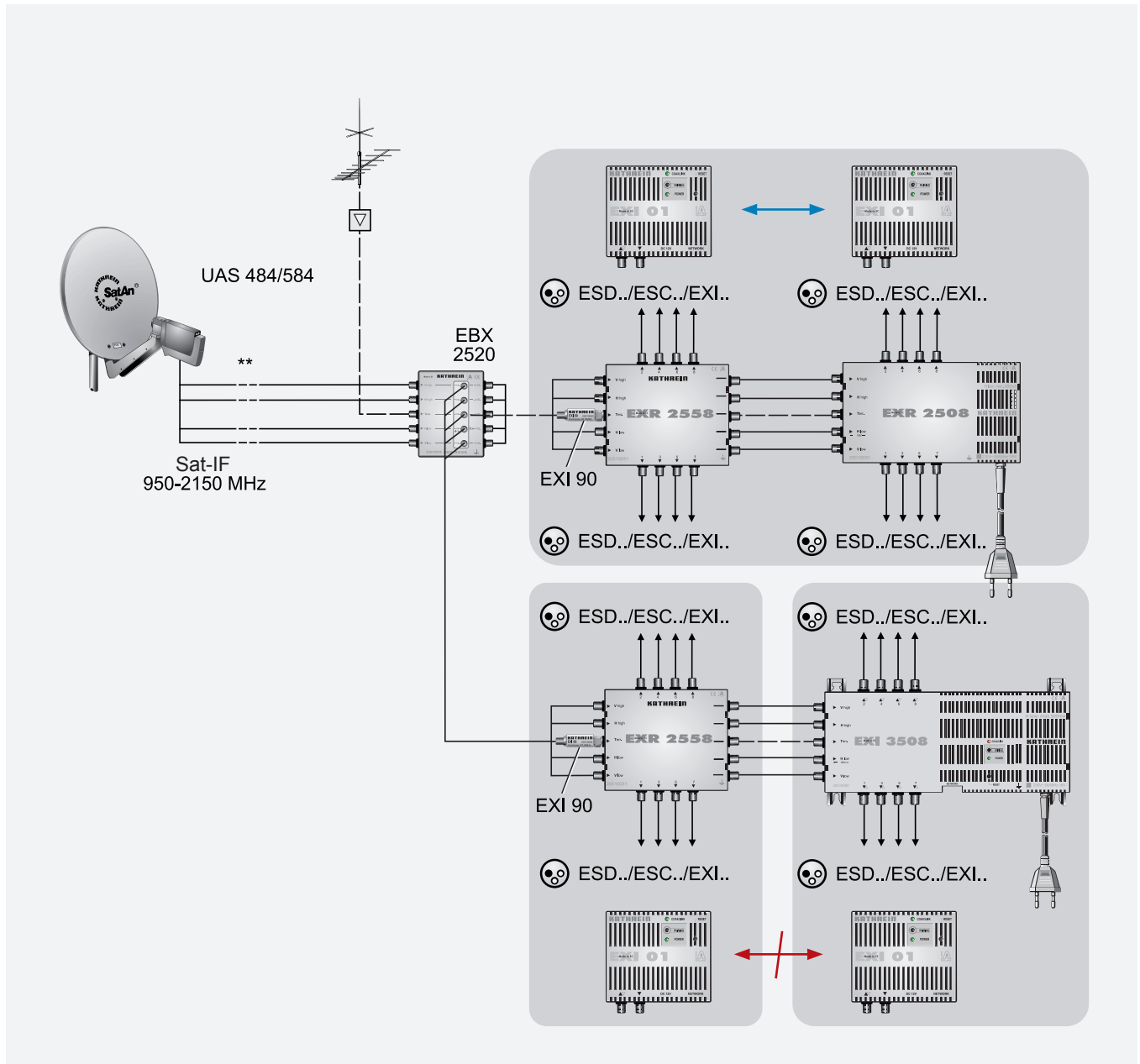
Outlets for the EXI 01 K-LAN modem

Kathrein outlets used	Output port used on the outlet for the EXI 01 modem
ESC 44, 84*	Any
ESD 30*	TV or radio port
ESD 32	SAT 2 (Right hand F-type (f) port)
ESD 08	Any
ESD 44*	Any
ESD 84	TV port
ESD 64 (no Sat)*	TV port
ESE 10*	Any
ESM 20, 30, 31, 32, 40, 41, 42, 70*	Modem port
ESU 33, 34, 36, 37*	TV port

* Remote feeding of the modem is not possible - the power supply must be provided via the power supply unit supplied with the EXI 01

The rule is: The EXI 01 modem can be connected to any Kathrein outlet in the respective cluster. The pre-requirement for this however is that the outlet supports the frequency range 5-68 MHz.

Further connection examples



** KAZ 11/12 over-voltage protection



Network (cluster)

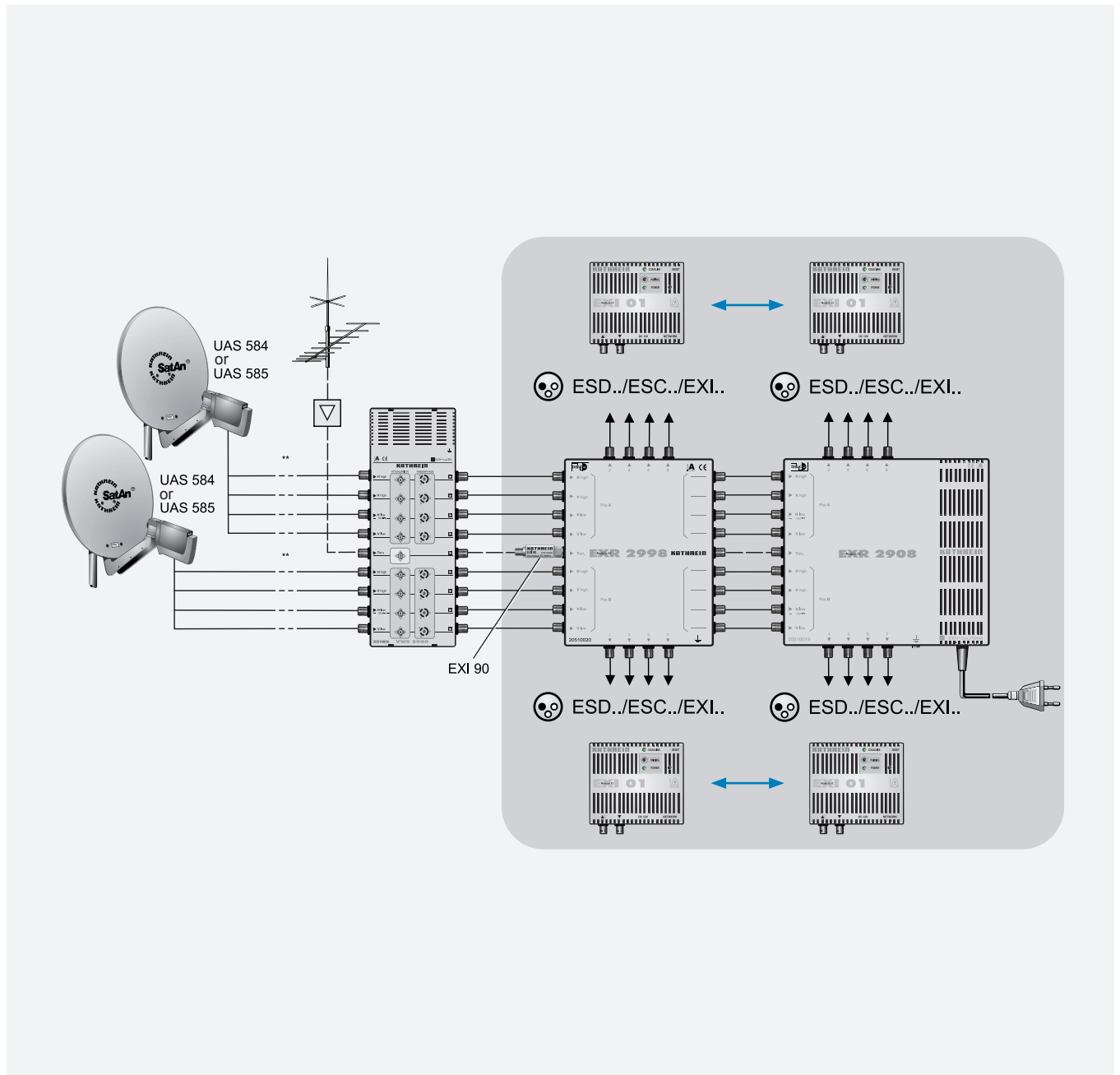
All modems within a cluster can communicate with each other.



Modems can communicate



Modems cannot communicate – clusters are isolated from each other



** KAZ 11/12 over-voltage protection



Network (cluster)

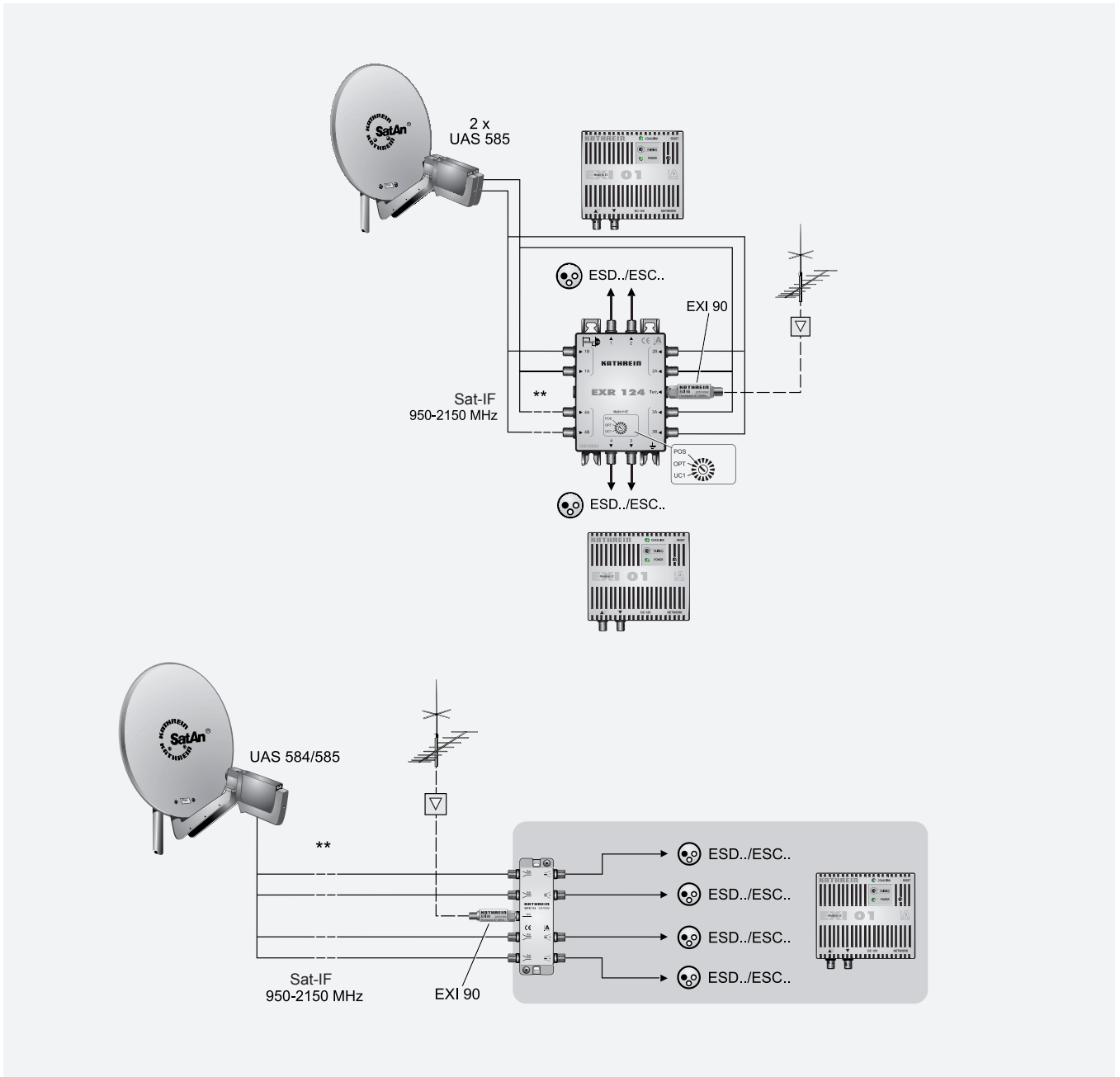
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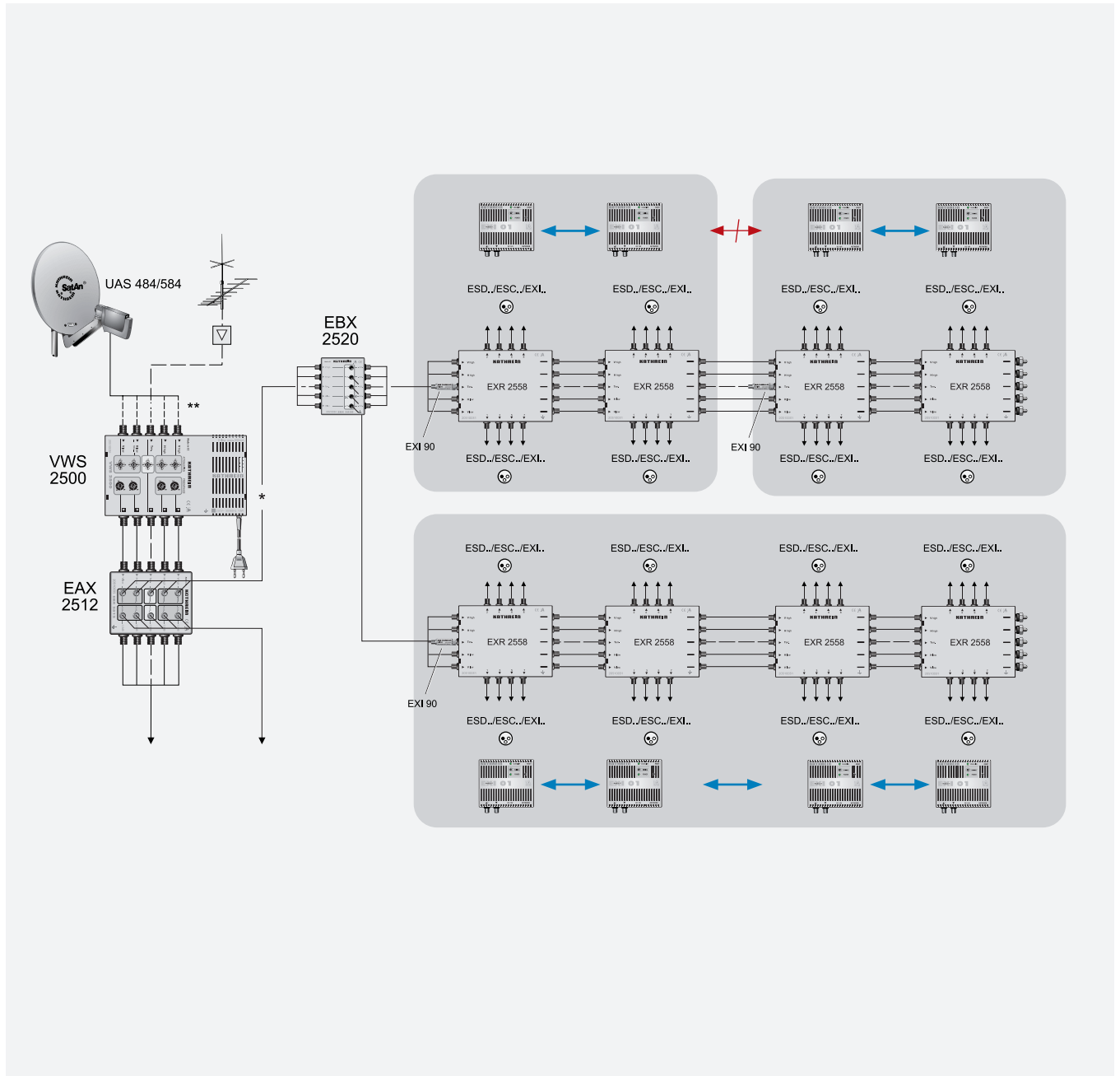
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** KAZ 11/12 over-voltage protection



The K-LAN EXI 30 outlet cannot be used! The modem power supply must be provided by the power supply unit supplied!



** KAZ 11/12 over-voltage protection



Network (cluster)

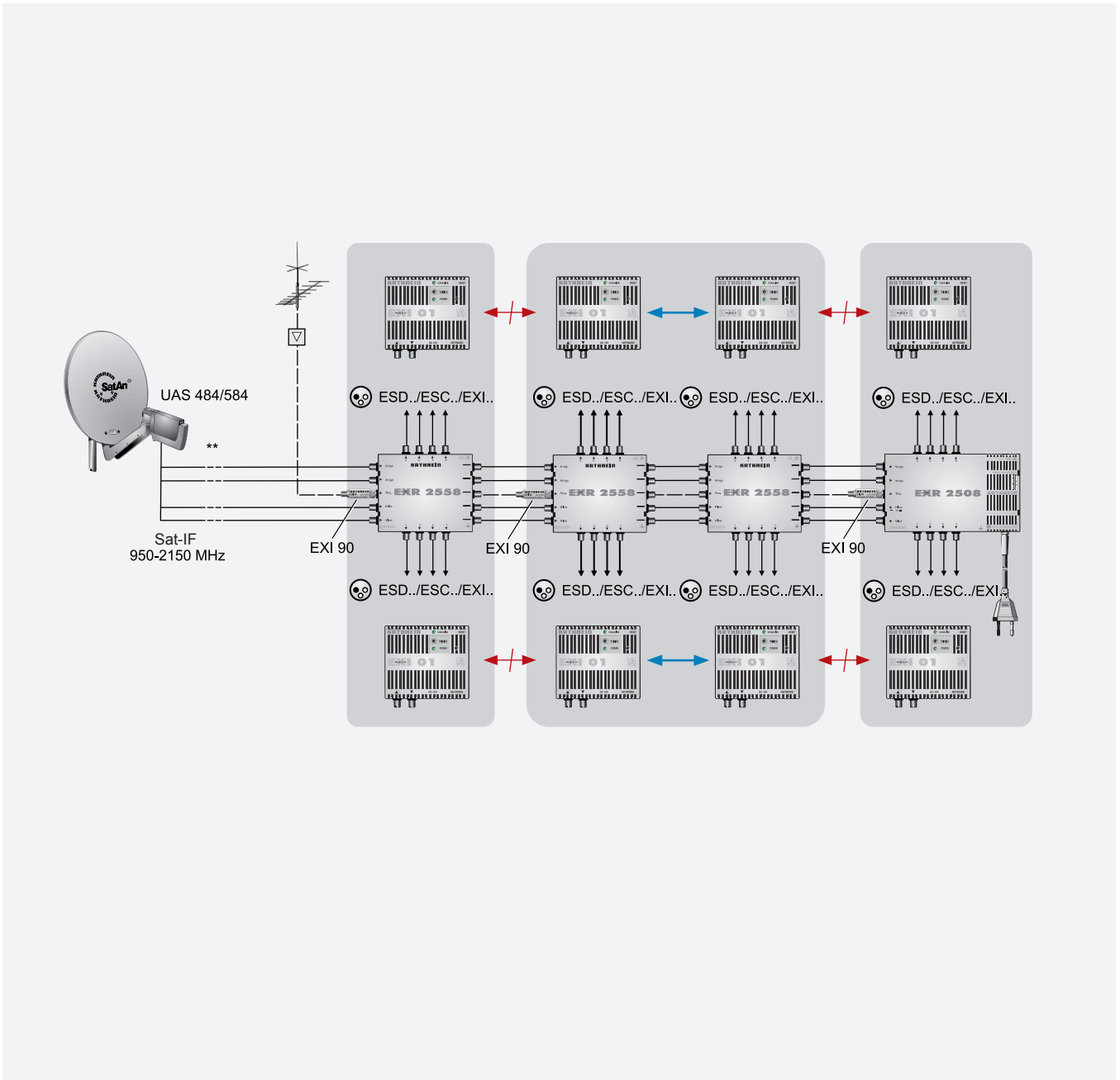
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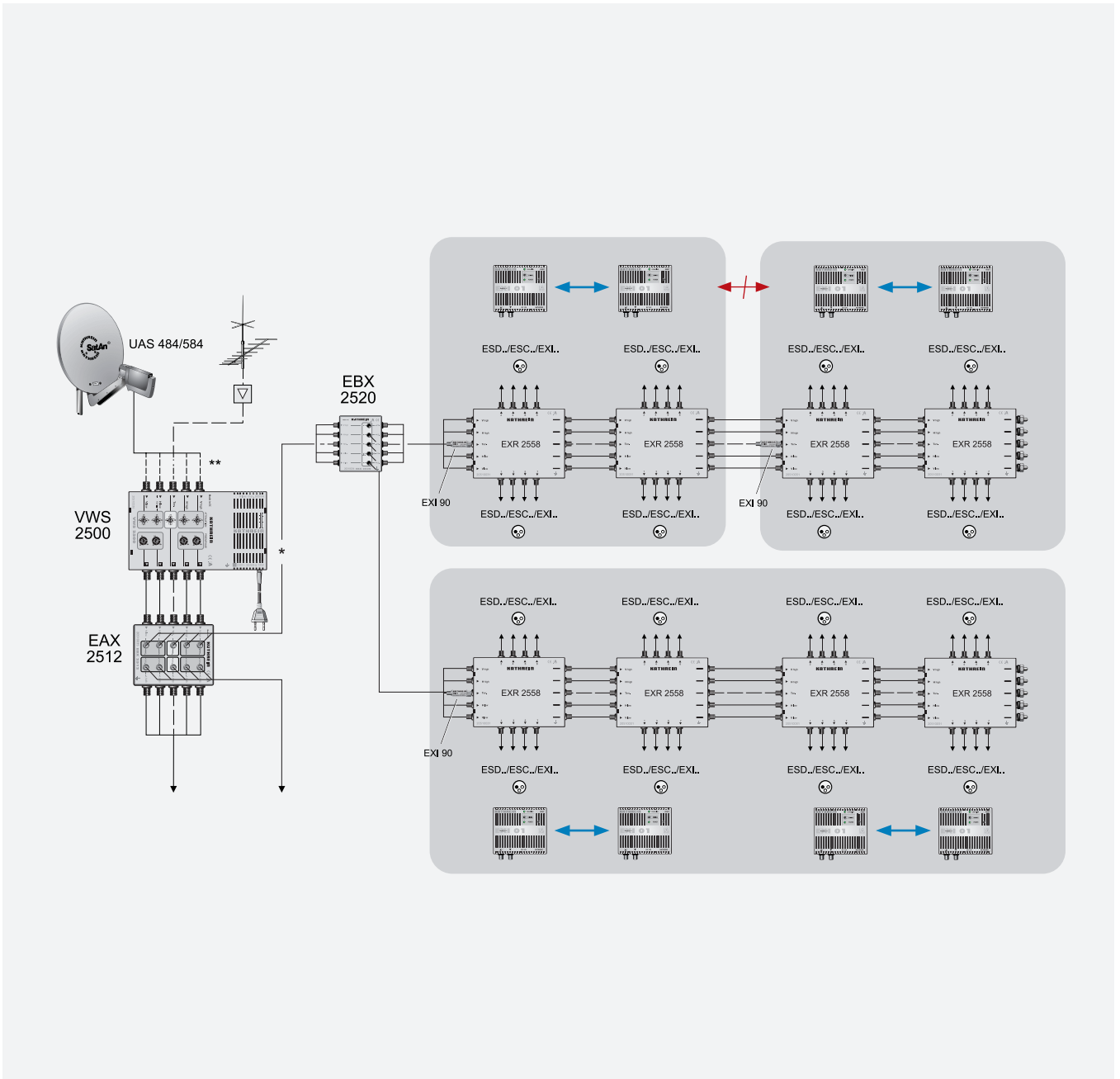
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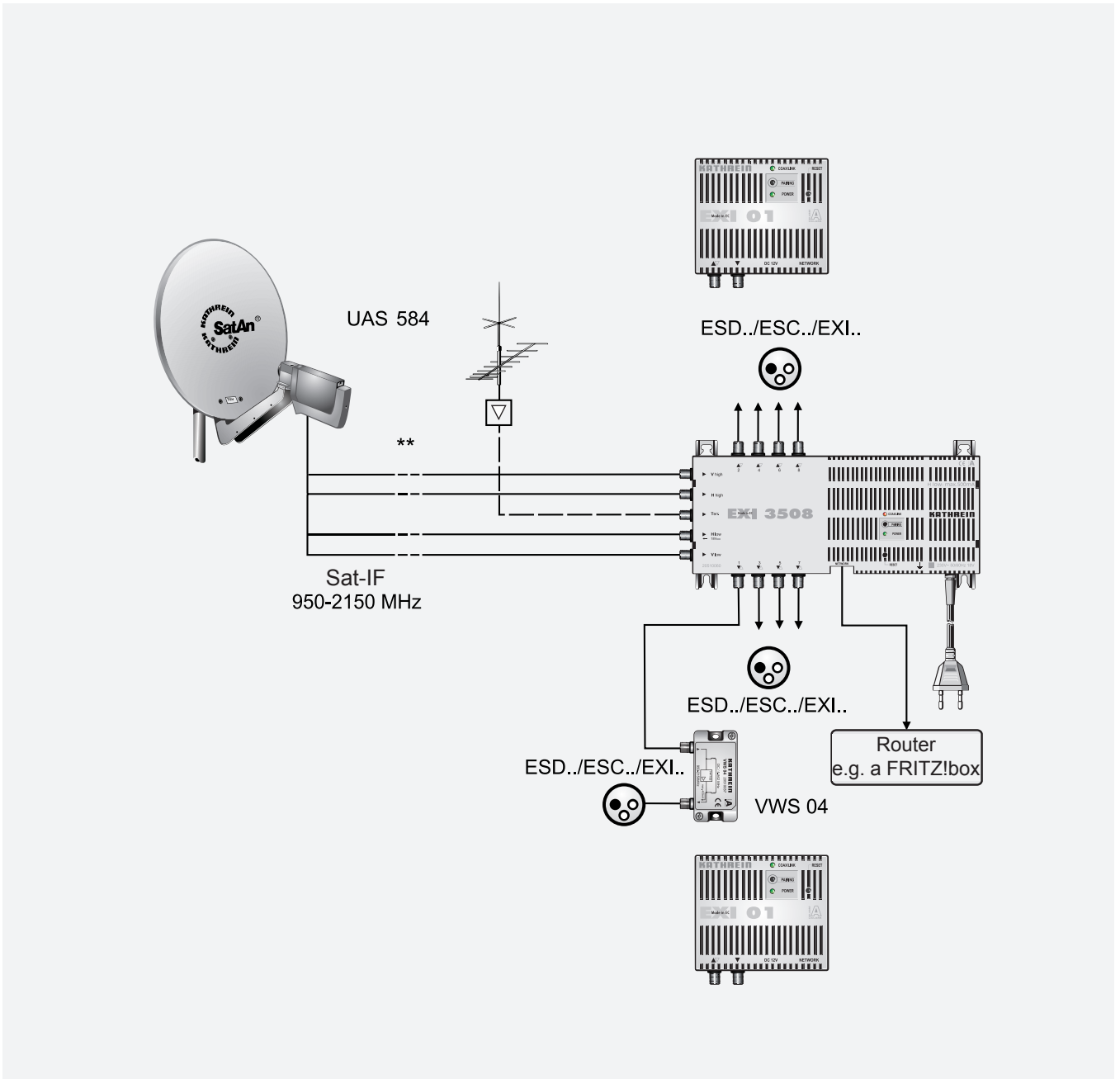
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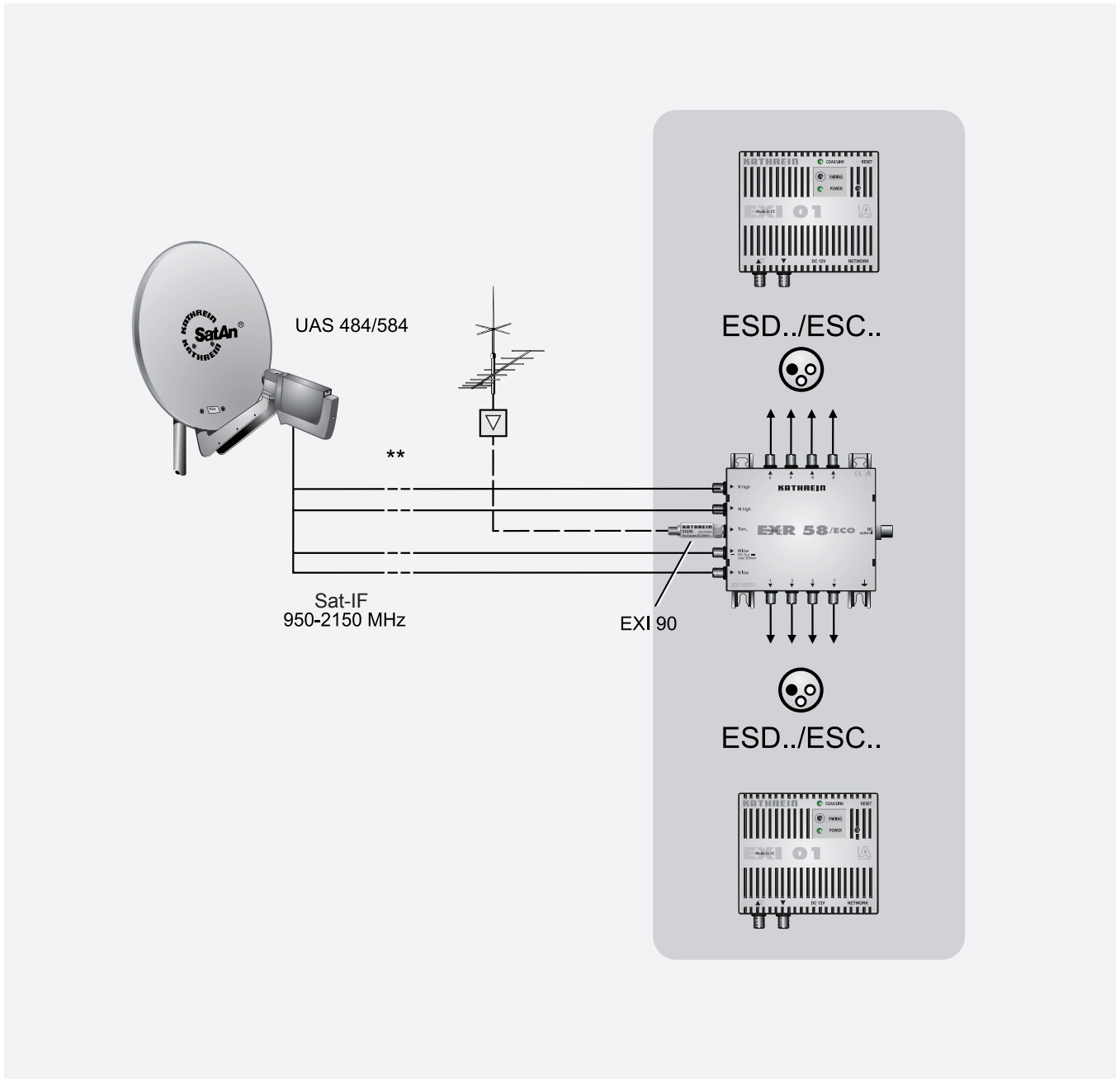
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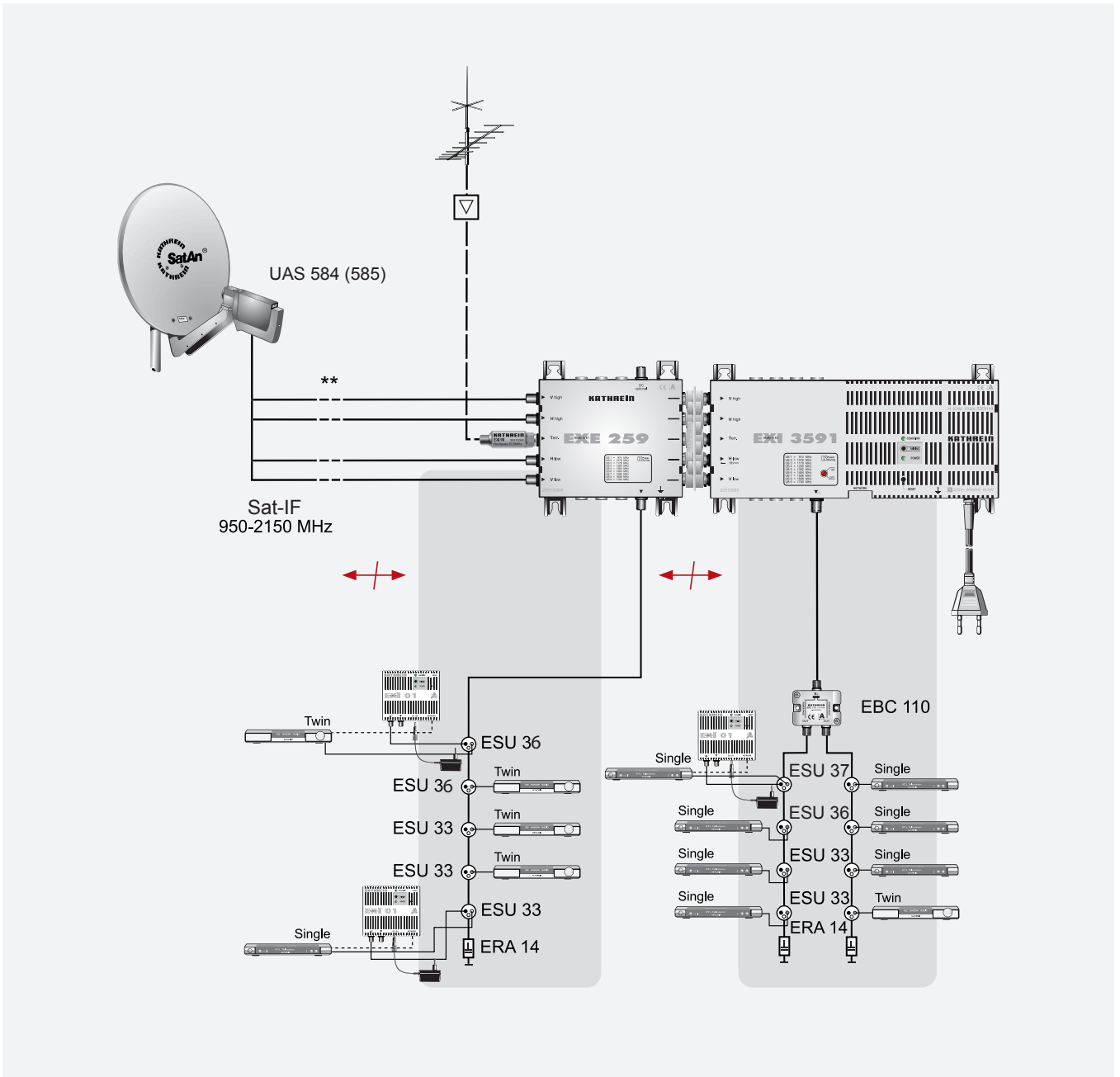
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** KAZ 11/12 over-voltage protection



The K-LAN EXI 30 outlet cannot be used! The modem power supply must be provided by the power supply unit supplied!



** KAZ 11/12 over-voltage protection



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All modems within a cluster can communicate with each other.



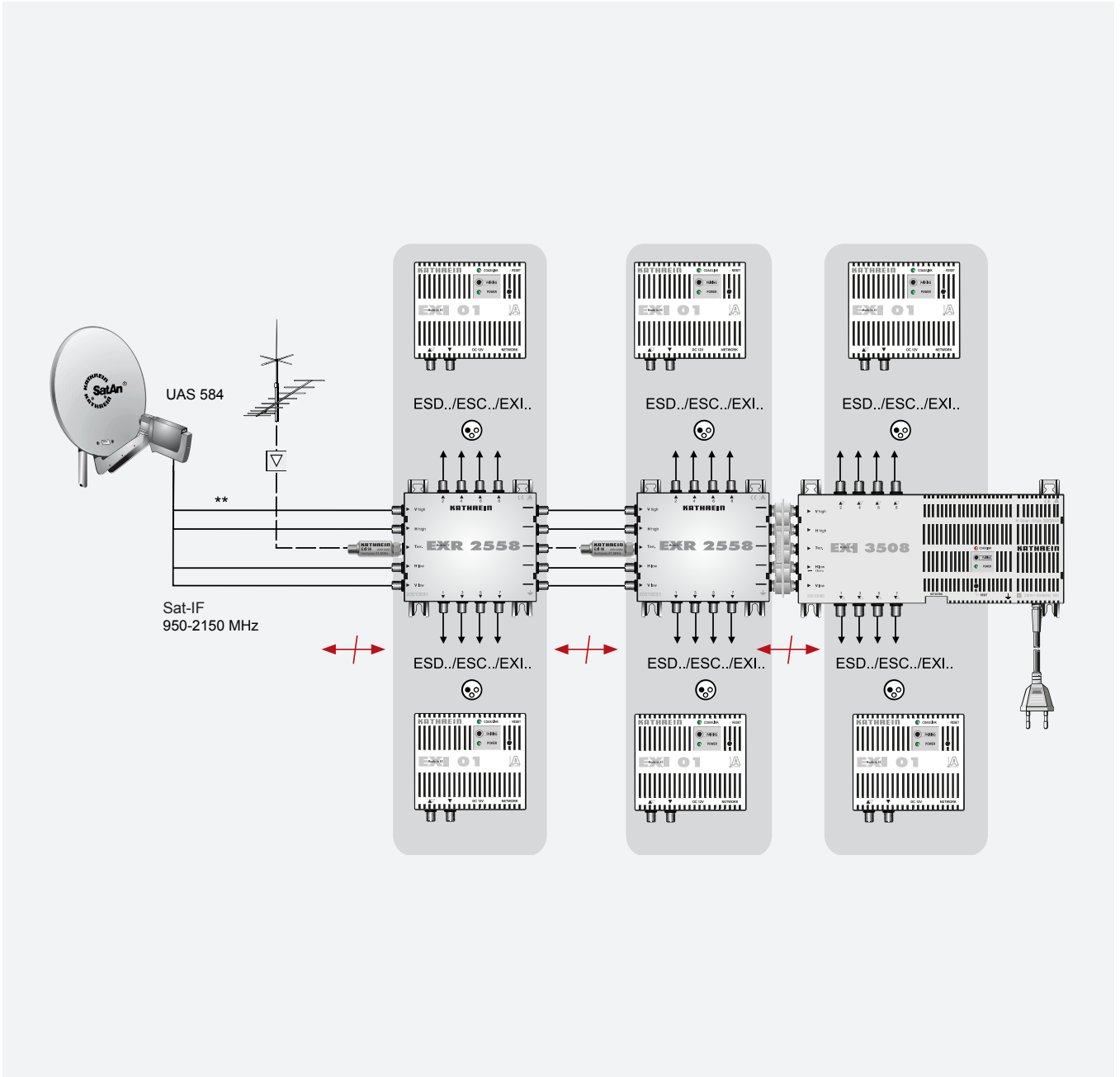
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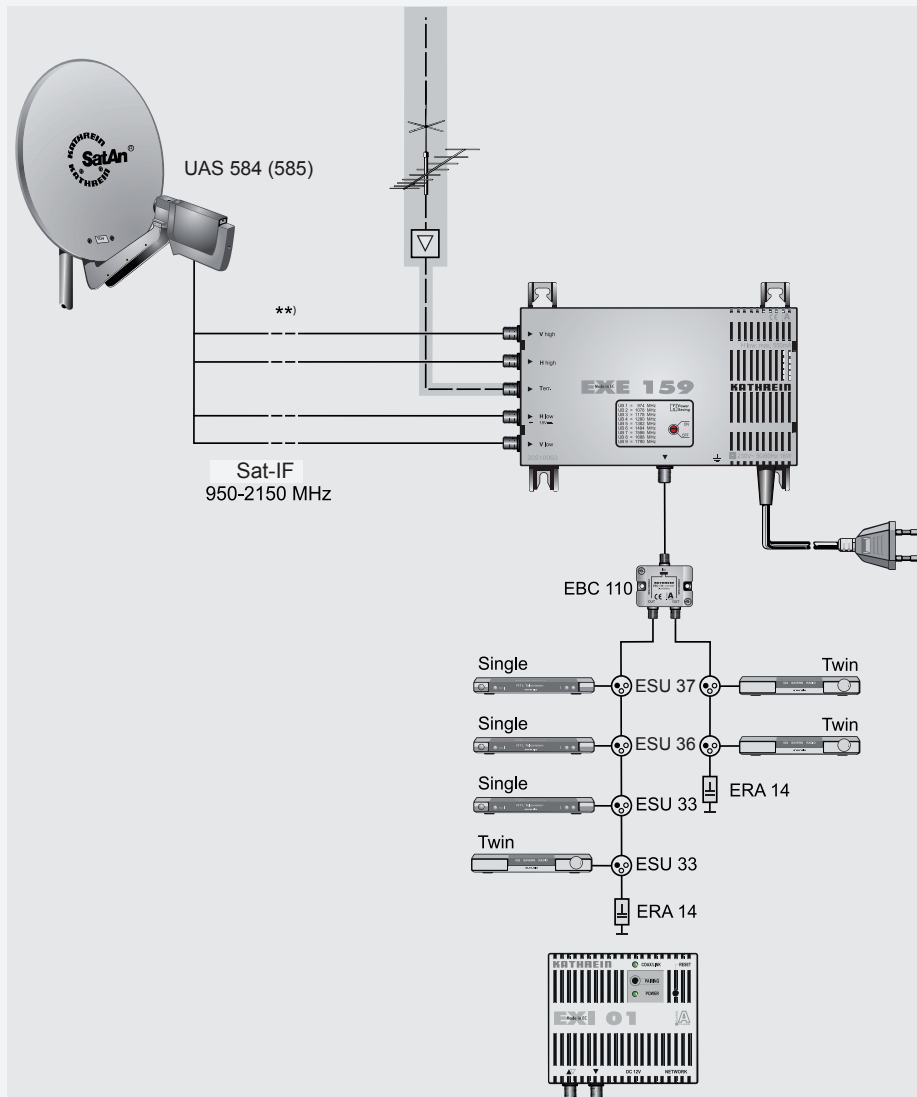
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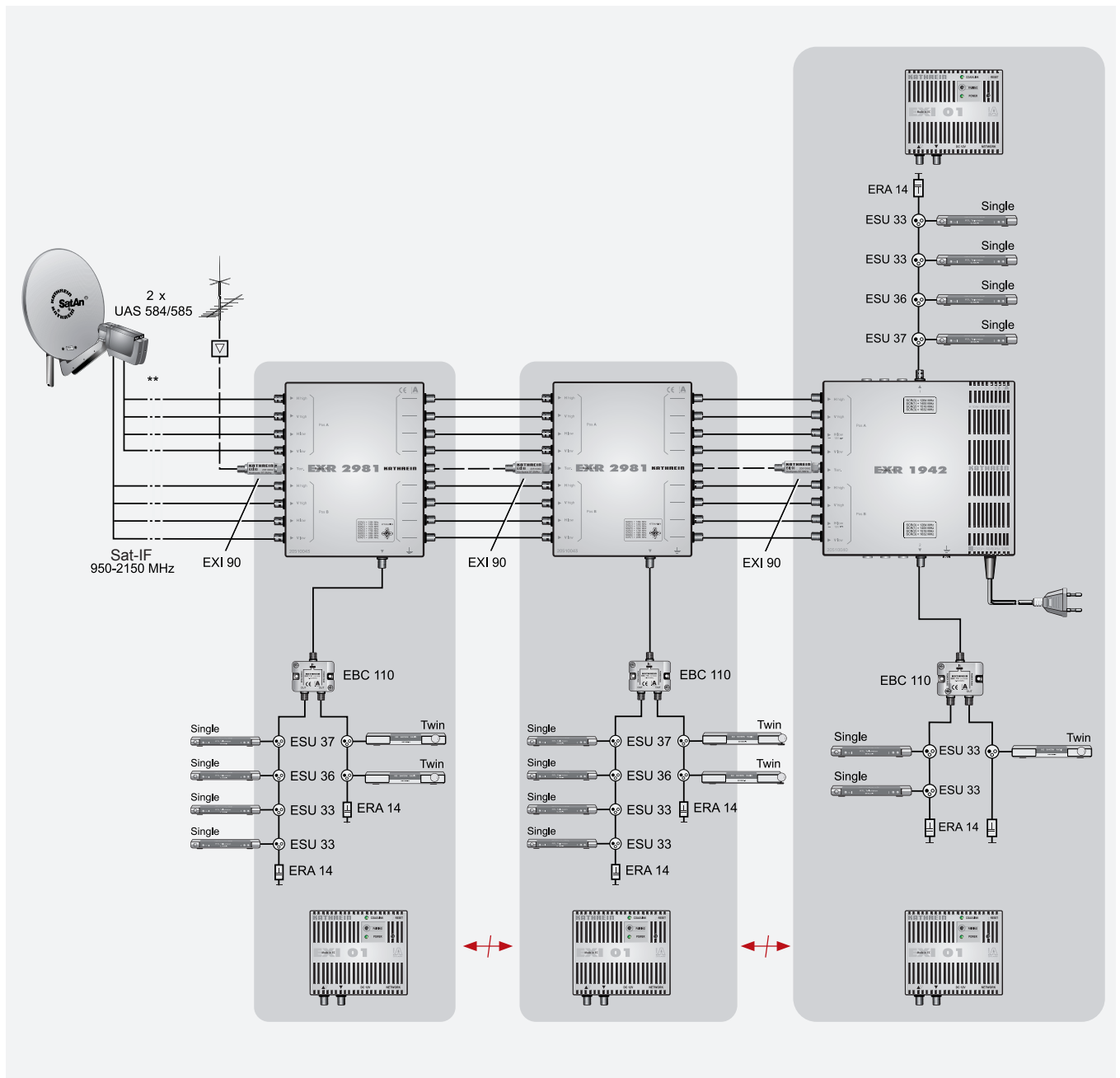
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Network (cluster)

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Modems can communicate



Modems cannot communicate – clusters are isolated from each other



The K-LAN EXI 30 outlet cannot be used! The modem power supply must be provided by the power supply unit supplied!

EXI 3508

Type	EXI 3508	
Order no.	20510060	
Multi-switch		
Subscriber connections	8	
Inputs	1 x terr.	4 x Sat-IF
Frequency ranges [MHz]	87.5-862	950-2150
Frequency ranges (subscribers) [MHz]	2-68/87.5-862	950-2150
Connection attenuation ¹⁾ [dB]	-/15 → 17	5 → 0
Horiz./Vert. decoupling [dB]	-	25
Subscriber decoupling [dB]	28/40	25
Max. output level ²⁾ [dBμV]	-	110
Vertical/horizontal input control [V]	12-14.5/16-19	
Low/High band control [kHz]	0/22	
Current consumption per subscriber [mA]	20	
Nominal input voltage [V]	230 (50-60 Hz)	
Permissible input voltage range [V]	207-253	
Nominal input power at 0-/150-/500-mA load ³⁾ [W]	1/4/10	
Secondary voltage ⁴⁾ [V]	18	
Max. total remote feed current ⁴⁾ [mA]	500	
Max. permissible remote feed current per trunk [mA]	-	
Protection class/protection type	II (double insulated)/IP 30	
Ambient temperature range [°C]	-20 to +55	
Connections	F-connectors	
Dimensions (W x H x D) [mm]	295 x 148 x 42.5	
Packing unit/weight [pc./kg]	1 (10)/approx. 0.7	
Integrated modem		
Frequency range IP (IEEE 1901) [MHz]	2-68 ⁵⁾	
Gross data rate [Mbit]	500	
Max. power consumption of the modem [mA]	350	
Power consumption at max. data rate [W]	Approx. 4.2	
Power consumption in stand-by [W]	Approx. 1.0	
Connections	RJ 45	
Standard supported	IEEE 1901	

¹⁾ Frequency-dependent attenuation⁴⁾ Via "horizontal low" input²⁾ To EN 60728-3, 35-dB-IMA⁵⁾ Of which actually used: 8-68 MHz³⁾ Without modem

EXI 3591

Type	EXI 3591	
Order no.	20510065	
Multi-switch		
Subscriber connections	9	
Inputs	1 x terr.	4 x Sat-IF
Frequency range [MHz]	87.5-862	950-2150
Connection attenuation (terrestrial) [dB]	9	-
Sat (AGC) output level [dB μ V]	-	88
Horiz./Vert. decoupling [dB]	-	30
Sat input level [dB μ V]	55-80	
Subscriber frequency/user band [MHz]	2-68/87.5-862	
Receiver 1	Receiver 5	1: 974/1
Receiver 2	Receiver 6	2: 1076/2
Receiver 3	Receiver 7	3: 1178/3
Receiver 4	Receiver 8	4: 1280/4
	Receiver 9	5: 1382/5
		6: 1484/6
		7: 1586/7
		8: 1688/8
		9: 1790/9
Screening factor [dB]	5-300 MHz > 85 300-470 MHz > 80 470-1000 MHz > 75 1000-2400 MHz > 55	
Permissible supply voltage at the subscriber output [V]	12-14	
Max. current consumption via the subscriber connection [mA]	10	
Nominal input voltage [V]	230 (47-63 Hz)	
Permissible input voltage range [V]	207-253	
Nominal input power at 0-/150-/300-mA load ¹⁾ [W]	6.1/9.2/12.2	
Secondary voltage ("horiz. low" input) [V]	18	
Max. permissible remote feed current ("horiz. low" input) ²⁾ [mA]	300	
Protection class/protection type	II (double insulated)/IP 30	
Ambient temperature range [°C]	-20 to +55	
Connections	F-connectors	
Dimensions (W x H x D) [mm]	295 x 148 x 42.5	
Packing unit/weight [pc./kg]	1 (10)/approx. 0.7	
Integrated modem		
Frequency range IP (IEEE 1901) ³⁾ [MHz]	2-68	
Gross data rate [Mbit]	500	
Current consumption of the modem [mA]	Max. 200	
Power consumption at max. data rate [W]	Approx. 4.2	
Power consumption in stand-by [W]	Approx. 1.0	
Connections	RJ 45	
Standards supported	IEEE 1901	

¹⁾ All nine subscriber frequencies / user bands in operation ²⁾ Via the "horizontal low" input ³⁾ Of which actually used: 8-68 MHz

EXI 01

Type	EXI 01	
Order no.	20510061	
Input - output	1 x DC & IP & FM & TV & Sat	1 x DC & FM & TV & Sat
Frequency range [MHz]	2-2150	87.5-2150
Frequency range IP (IEEE 1901) [MHz]	2-68 ¹⁾	-
Through loss [dB]	-	1
Screening factor [dB]	5-300 MHz > 85 300-470 MHz > 80 470-1000 MHz > 75 1000-2150 MHz > 55	
Permissible remote power feed at the output [V]	12-20	
Max. power consumption of the modem [mA]	350	
Power consumption at max. data rate [W]	Approx. 4.2	
Power consumption in stand-by [W]	Approx. 1.0	
Permissible current consumption of the multi-switch from the receiver when remotely fed [mA]	50 ²⁾	
Gross data rate [Mbit/s]	500	
Ambient temperature range [°C]	0 to +40	
Connections	F-connectors / RJ 45/5.5 x 2 mm latching plug	
Standards supported	IEEE1901	
Dimensions (W x H x D) [mm]	104 x 101 x 29.5	
Packing unit/weight [pc./kg]	1 (10)/approx. 0.35	
Power supply unit		
Nominal input voltage [V]	230	
Secondary voltage [V]	12	
Max. output current [mA]	600	
Nominal input power at (300-/0-mA load) [W]	4.5/0.25	
Satisfies the directives	2009/125/EC in accordance with regulations 278/2009/EC, 2006/95/EC together with the standards current at the time of delivery	

¹⁾ Of which actually used: 8-68 MHz

²⁾ If the plug-in power supply unit is being used, the full feeder current of the receiver is available for the connected consumers

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