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S.N. RADIOCOMUNICAȚII S.A.
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3011 / 12253 / 18.09.2020

SOCIETATEA NAȚIONALĂ DE RADIOCOMUNICAȚII S.A. RADIOCOM

Approved by,

Technical Executive Director
Alin TERCHILĂ

SOCIETATEA NAȚIONALĂ DE RADIOCOMUNICAȚII S.A. DIRECTOR EXECUTIV TEHNIC 2

AoIP PROJECT

Modernization and efficiency improvement of the modulation transmission network for radio transmitters

TECHNICAL REQUIREMENTS

Technical Section

LOT 1 - AoIP transport equipment and accessories

The technical requirements document is an integral part of the award documentation and constitute the set of requirements on the basis of which the technical proposal is elaborated by each tenderer.

CAP. I. OBJECTIVE OF THE ACQUISITION

The main objective of the Audio over IP (AoIP) project is to implement the strategic lines of National Radiocommunication Society (Societatea Nationala de Radiocomunicatii - SNR) on the modernization of the modulation's transport network for public radio programs.

The proposed technical solution ensures the takeover, transport and distribution in standardised digital format, according to AoIP rules, of the national, regional, territorial and local programmes provided by the national and regional studios of the Romanian Broadcasting Society.

Through the implementation process of the DVB-T2 project, for the transport of AoIP modulation will be used the newly installed Ericsson IP microwave links network, which will be completed with peripheral segments consisting of IP DragonWave microwave links equipment, thus the transport solution is provided, remaining as necessary only the acquisition of coding, decoding and auxiliary equipment specific to studios and broadcasting locations.

CAP. II. OBJECT OF THE ACQUISITION

In order to implement the project, SNR will purchase products and services as follows:

1. Electronic communications equipment, including commissioning and acceptance services for some of them, as defined in this document.
2. Spare parts.
3. Support and warranty services.
4. Training services (schooling).
5. Delivery services as defined in this document.

CAP. III. INSTRUCTIONS FOR DRAWING UP THE OFFER

The technical specifications detail how the contracting authority, hereinafter referred to as the Purchaser, wants the Tenderer to provide the equipment that makes up the technical solution for the transport of the AoIP modulation.

The technical specifications are detailed in the form of conformity tables for each of the component equipment of the AoIP modulation transport solution. These tables will be completed by tenderers in accordance with the instructions detailed in this document.

The Technical requirements document contains the minimum and mandatory technical specifications and the submitted offers must ensure a level equal to or greater than the requirements of the specifications. Product offers having technical characteristics lower than those laid down in the specifications shall be declared non-compliant.

All equipment/modules/cards/accessories/software or firmware licenses leading to the fulfillment of a requirement will also be included in the financial offer, both as unit price and in the total value of the offer, in relation to the entire quantity of equipment subject to purchase. Equipment/ module/ card/ accessory/software license or firmware that results in a requirement will not be considered optional.

The offer will consist of at least the following components:

- Compliance table,
- Annexes,
- Technical documentation of the manufacturer.

CAP. IV. TECHNICAL SOLUTION DESCRIPTION

This technical solution proposes the creation of a new digital audio signal transport network, over an IP network.

For the transport of AoIP modulation from studios to FM / LW / MW / SW broadcast sites, audio stream transport circuits will be configured on the equipment to be purchased through this procedure, as well as on the equipment related to the existing IP-MPLS network and the newly built IP microwave links network, as shown in the diagram in Annex 2 – Modulation transport scheme.

CAP. V. GENERAL REQUIREMENTS

1. The tenderer shall submit the technical tender in accordance with the specifications of this document and respond to these requirements one by one.
2. The tenderer must supply new equipment sealed by the manufacturer and in current production at the time of the tender.
3. All equipment to be delivered shall have the date of manufacture not later than 180 days before the date of delivery and shall be marked on each equipment.
4. Equipment classified by the manufacturer as reused ("refurbished") is not accepted.
5. The tenderer must submit a declaration by assumption from the equipment manufacturer stating that all the equipment offered will not be declared *End of Sale* before 31.12.2026. The declaration shall be addressed to SNR with a date of issue not exceeding 30 days prior to the submission of the tender.
6. The tenderer must submit a declaration by assumption from the equipment manufacturer stating that all the equipment tendered will not be declared End of Support before 31.12.2030. The declaration shall be addressed to SNR with a maximum date of issue of 30 days prior to the submission of the tender.

7. The tenderer shall ensure the transport of equipment to SNR warehouses, as listed in Annex 3 – Equipment delivery addresses. The equipment will be delivered with all technical documentation and factory measurement test reports.

8. The technical documentation will refer to all elements of the offered equipment:
   - Encoder.
   - Decoder
   - Audio splitter
   - Audio Switch
   - Installation and grounding kit.
   - Procedure for carrying out technical support activity and equipment warranty.
   - Other elements, as appropriate.

9. The supplier must provide in the offer as 'Technical documentation', at least the following elements:
   - Technical specifications of the equipment.
   - Installation instructions.
   - User guide.
   - General theory.
   - Maintenance and adjustment instructions.
   - Troubleshooting guide.
   - Component list.

10. The technical documentation for the equipment delivered will be in English or Romanian in the original and will be provided as follows: an electronic (text searchable) set.

11. The technical documentation submitted must be the official documentation of the manufacturer.

12. Claims concerning the conformity of the technical characteristics of the products tendered with the requests for this specification must be substantiated by reference to the technical documentation submitted and references to the technical documentation shall have clearly defined the identification coordinates: page, chapter, article, paragraph, alignment, etc. The conformity of the offer shall be tested in the form of a matrix (table) of conformity.

Technical characteristics compliance table			
Nr. crt.	**Requirements**	**Compliance [YES/NO]**	**Reference to the technical documentation [page, chapter, article, paragraph, etc.]**

13. The supplier must specify the values for each technical parameter requested (the mere entry "Corresponds") is not sufficient.

14. The tenderer must submit a declaration from the equipment manufacturer, to the attention of the SNR, dated the month and year in which the tender is submitted, stating that he is authorized to provide delivery and technical support for all levels, for the equipment offered in the technical solutions.

15. Equipment and spare parts prices will also include the costs of associated software licenses.

16. Copies of all software/firmware applications used in the equipment will also be provided on USB support in addition to uploading them to the equipment

17. Upgrading the software/firmware will be free within the first 4 years of installation and SNR will be registered as an end user for all licenses delivered with the equipment.

18. All equipment offered must be certified "EC" and RoHS 2002/95/EC, R&TTE 1999/5/EC, Safety: EN 60215, EMC: EN 301-489-1, the latest variants. The tenderer must make available to the beneficiary the certificates of conformity for the offered equipment.

19. The tenderer must be ISO 9001.

20. Failure to comply with technical parameters or lack of EC and conformity certificates will result in disqualification of the tenderer.

21. The marking and packaging of the equipment must be performed according to the provisions of their execution standards, so as to ensure the necessary visual identity, as well as their integrity during transport, handling and storage.

22. Packaging and their component parts must comply with Directive 94/62/EC of the European Parliament and of the Council of 20 December 1994 on packaging and packaging waste (Official Journal L/365/10), with subsequent amendments and additions. The packaging and their component parts are included in the price of the equipment.

23. The tenderer must submit a declaration by assumption from the equipment manufacturer that it has its own working point providing technical assistance with the following facilities, but not limited to them:

- Opening of trouble tickets directly to the equipment manufacturer for any hardware or software/firmware issues for the equipment offered.
- Software/firmware updates of equipment and their components provided directly by the equipment manufacturer at no additional cost during the warranty period offered.
- Remote technical support for software/firmware and hardware configurations directly by the equipment manufacturer at no additional cost during the warranty offered.

The declaration shall be addressed to National Radiocommunication Society, with a date of issue not exceeding 30 days prior to the submission of the tender.

CAP. VI. TECHNICAL REQUIREMENTS

No.	REQUIREMENTS	[YES/NO]	NOTES

TECHNICAL REQUIREMENTS ENCODING EQUIPMENT			
1.	**General requirements**		
1.1	The equipment will have digital audio signal encoding capabilities.		
1.2	The equipment will have all licenses pre-installed and activated.		
1.3	The equipment will operate in accordance with the provisions of this document without any hardware limitation.		
1.4	The equipment will operate in accordance with the provisions of the present document without any software limitation.		
1.5	The lifetime of the licences will be unlimited and will not incur additional costs from the acquirer.		
1.6	The entire batch of equipment offered will contain only one model of equipment		
1.7	The equipment will have configuration capabilities for integration into a Single Frequency Network (SFN). For this purpose, the tenderer will provide a description of the solution together with the proposed configuration model		
1.8	Type 19-inch rack-mountable		
1.9	The equipment will be equipped with two 230V AC power supplies.		
1.10	In the event of a power supply failure, the equipment will be able to operate without limitation hardware or software with the second power supply.		
1.11	In the event of a power failure on one power supply, the equipment will be able		

	to operate without hardware or software limitation with a second power supply.		
1.12	The equipment will be supplied with power cable for each source, of minimum length 2m to connect to the EU type F outlet		
1.13	Operating temperature 10 - 45 degrees C		
2	**Digital audio input interfaces:**		
2.1	The equipment will have at least two digital audio inputs		
2.2	The digital audio input is AES / EBU (AES3) and the connector will be XLR female. If the equipment does not have an XLR connector, the supplier provides SNR at no additional cost to the purchaser, an adaptation kit that will end in a 19" rackable patch panel with female XLR connectors.		
2.3	The number of connectors will be sized according to the number of digital inputs.		
2.4	Digital audio input level -13dBfs ÷ 0dBfs		
3.	**Ethernet interfaces:**		
3.1	Minimum 2 electrical Ethernet ports		
3.2	Minimum speed 10 / 100Mbps		
3.3	RJ-45 connector type		
3.4	Interfaces can be configured individually.		
3.5	Both Ethernet interfaces will be used to transmit unicast / multicast packets.		
3.6	IP transport protocol: - UDP - RTP		

3.7	On each Ethernet interface, at least 2 different output streams can be configured (unicast or multicast or any combination of unicast and multicast)		
3.8	The equipment will have the ability to configure a number of output streams at least twice the number of digital audio inputs.		
3.9	The management of the equipment will be performed either through a dedicated Ethernet port (electrical Ethernet interface, minimum speed 10 / 100Mbps, RJ45 connector type), or through one of the two interfaces that is used at the same time to transmit the unicast / multicast signal.		
3.10	Data traffic on Ethernet interfaces can be separated at VLAN level		
4.	**Audio signal encoding protocols**		
4.1	Encoding algorithm: - MPEG 1/2 Layer II - MPEG4: AAC-LD / ELD, HE-AAC v1 / v2 - MPEG2 / 4: AAC-LC - Enhanced apt-X (E-aptX) - Linear PCM		
4.2.	Sampling rates of 32, 48 KHz		
5.	**Remote monitoring and administration:**		
5.1	The equipment must be capable of being integrated into any management system based on the SNMP v2c protocol. For this purpose, the tenderer will provide the complete and documented MIB files		

	for the equipment tendered		
5.2	Access levels for at least 2 types of users: read-only and full-access.		
5.3	Remote equipment configuration via GUI / WEB		
5.4	In order to configure the equipment remotely, the IP management interface must have the following parameters: - IP address - Net mask - Gateway IP		
TECHNICAL REQUIREMENTS FOR THE AUDIO SPLITTER EQUIPMENT			
1	Minimum 1 digital audio input AES / EBU XLR female connector		
2	A minimum of 3 digital audio outputs will be available for each digital audio input AES / EBU XLR male connector		
3	The equipment will have a 19 inch rack mounting system, or will be supplied with a 19" rack support tray		
4	Impedance 110Ω, Insertion Loss <0.1 dB, Impedance Match +/- 2%, Output to Output Insulation min 40dB, Max Signal 10 V P-P		
5	The attenuation / loss generated by the splitter will be a maximum of 3dB		
6	The whole lot of offered equipment will contain a single model of equipment		
7	If the audio splitter is 'active' type, the equipment should be able to be integrated in any SNMP v2c protocol based management system. For this purpose, the		

	tenderer will provide the complete and documented MIB files for the offered equipment		
TECHNICAL REQUIREMENTS FOR DECODING EQUIPMENT			
1.	**General requirements**:		
1.1	The equipment will have digital audio signal decoding capabilities.		
1.2	The equipment will have all licenses pre-installed and activated.		
1.3	The equipment will operate in accordance with the provisions of this document without any hardware limitation		
1.4	The equipment will operate in accordance with the provisions of the present specification without any software limitation.		
1.5	The lifetime of the licences will be unlimited and will not incur additional costs from the acquirer.		
1.6	The licenses provided can be reused regardless of changes in the hardware and software structure of the system. Thus, the tenderer will provide technical support for re-use of licences throughout their lifetime, at no additional cost to the acquirer		
1.7	The whole lot of offered equipment will contain a single model of equipment		
1.8	The equipment will have configuration capabilities for integration into a Single Frequency Network (SFN). For this purpose, the tenderer will provide a description of the solution together with the proposed configuration model.		

1.9	Mountable in 19 inch type rack		
1.10	The equipment will be equipped with two 230V AC power supplies.		
1.11	In the event of a power failure, the equipment will be able to operate without hardware or software limitation with the second power supply.		
1.12	In the event of a power failure on one power supply, the equipment will be able to operate without hardware or software limitation with the second power supply.		
1.13	The equipment will be supplied with power cord for each source, minimum length 2m for connection to EU type F socket		
2	**Digital audio output interfaces:**		
2.1	The equipment will have at least two digital audio outputs		
2.2	The digital audio output is AES / EBU (AES3), and the connector will be XLR male. If the equipment does not have an XLR connector, the supplier provides SNR at no additional cost to the purchaser, an adaptation kit that will end in a 19 rackable patch panel with male XLR connectors.		
2.3	The number of connectors will be sized according to the number of digital outputs.		
2.4	Digital audio output level -13dBFS ÷ 0dBFS		
3.	**Ethernet interfaces**:		

3.1	Minimum 2 electrical Ethernet ports		
3.2	Minimum speed 10 / 100Mbps		
3.3	RJ-45 connector type		
3.4	Interfaces can be configured individually.		
3.5	Both Ethernet interfaces will be used to receive unicast / multicast packets.		
3.6	IP transport protocol: - UDP - RTP		
3.7	On each Ethernet interface, it can be configured at least two different input streams (unicast or multicast or any combination of unicast and multicast)		
3.8	The equipment will have the ability to configure a number of input streams at least twice the number of digital audio outputs.		
3.9	The management of the equipment will be performed either through a dedicated Ethernet port (electrical Ethernet interface, minimum speed 10 / 100Mbps, RJ45 connector type), or through one of the two interfaces that is used at the same time for the reception of the unicast / multicast signal.		
3.10	Data traffic on Ethernet interfaces can be separated at the VLAN level		
4.	**Audio signal decoding protocols**		
4.1	Decoding algorithm: - MPEG 1/2 Layer II - MPEG4: AAC-LD / ELD, HE-AAC v1 / v2		

	- MPEG2 / 4: AAC-LC - Enhanced apt-X (E-aptX) - Linear PCM		
5.	**MPX protocol**		
5.1	MPX Ready, the MPX function should be available by license appliance.		
5.2	After applying the licence, the MPX should be available using at least one interface already existing on the equipment.		
6.	**Remote monitoring and administration:**		
6.1	The equipment must be capable of being integrated into any management system based on the SNMP v2c protocol. For this purpose, the tenderer will provide the complete and documented MIB files for the equipment offered.		
6.2	Access levels for at least 2 types of users: read-only and full-access.		
6.3	Remote equipment configuration via GUI / WEB		
6.4	In order to configure the equipment remotely, the IP management interface must have the following parameters: - IP address - Net mask - Gateway IP		
7	**Signal redundancy capabilities**		
7.1	Capability to receive audio stream via internet. In this sense, the proposed technical solution will be described.		

7.2	Restoring the digital audio signal from two input streams so that in case of degradation of the parameters of one of the two streams, the quality of the output audio signal is not affected.		
TECHNICAL REQUIREMENTS FOR AUDIO SWITCH EQUIPMENT			
1	Minimum 2 digital audio inputs AES / EBU XLR female connector		
2	Minimum 1 digital audio output AES / EBU male XLR connector		
3	Switching between input sources will be performed automatically depending on the presence of the input audio signal (silent detect)		
4	Possibility for the user to configure the waiting time until the switching in steps of 1 second (the moment of detecting the lack of signal). The limits of the waiting time configuration interval will be transmitted		
5	If the equipment suffers a general failure, or a general power failure, then the input audio digital signal shall be provided to the main output without interruption. Bypass function - the main output is physically connected to the main input in case of power failure		
6	The entire batch of offered equipment will contain only one model of equipment.		
7	Remote equipment configuration via GUI / WEB		
8	The equipment will have a 19 inch rack mounting system, or will be supplied with		

	a 19 "rack support tray		
9	Power supply: 230V AC		
10	The equipment will be supplied with power cord for each source, minimum length 2m for connection to EU type F socket		
11	Operating temperature 10 - 45 degrees C		
12	The equipment will not damage the quality of the audio input audio signal		
13	Access levels for at least 2 types of users: read-only and full-access.		
14	The equipment must be capable of being integrated into any management system based on the SNMP v2c protocol. For this purpose, the tenderer will provide the complete and documented MIB files for the equipment offered.		
15	Direct access 24/7/365 at the support web page for SNR (based on username and password) with the purpose of opening trouble ticket directly to the manufacturer of the equipment.		
16	Software configuration support available 8/5/365.		
SPECIFIC TECHNICAL REQUIREMENTS FOR TECHNICAL SUPPORT AND WARRANTY			
1	Technical support services and warranty for equipment, spare parts and applications (including operating systems) running on the equipment offered as a result of the requirements of this specification shall be at least 4 years		
2	During the warranty period,		

	equipment/modules/defects will be replaced within 30 days of the delivery of the defective mark to the Tenderer, at no additional cost to the Purchaser		
3	The transport costs associated with the replacement of the parts referred to in the preceding paragraph shall be borne by the Tenderer		
4	24/7/365 direct access to the support web page (user-based and password-based) for opening the trouble ticket directly to the manufacturer		
5	24/7/365 software configuration support		

CAP. VII. FACTORY ACCEPTANCE TESTS

1. The equipment will be tested to create a fully functional system for encoders, decoders, splitters, auxiliary audio switches, according to Annex 2, respecting the scenarios for 1-10 programs and broadcast sites with one to 5 radio transmitters.
2. Factory acceptance tests shall include at least the following:
   - Checking commands and settings
   - Operation of the security system: alarms, protections, switches
   - Power supply system redundancy operation check
   - Check redundancy operation in audio splitter configuration and two encoders for at least two programs
   - Verification of redundancy operation in the configuration of two decoders and audio switch for at least two programs
   - Verification of redundancy operation in fully functional configuration according to Annex 2.
   - Checking functionality of encoding / decoding algorithms, unicast / multicast / multiunicast transport
3. The measured values must comply with the values in the technical specifications.
4. Factory acceptance tests will take place for at least 3 days for 5 people.
5. Travel costs (transport, accommodation, lunch) of SNR staff participating in factory acceptance tests will be included in the offer.

CAP. VIII. COMMISSIONING, ACCEPTANCE AND ON SITE SCHOOLING

1. The operations carried out during the configuration and commissioning on site will include at least the following:
   - Check of the installation of the all the equipment and the connections between them.
   - Configuration of all equipment for commissioning.
   - Checking the operation of the safety system: alarms, protections, switches.
   - Integration in NMS with SNMP protocol.
2. On-site acceptance tests for audio over IP equipment shall include at least the following:
   - Measurement of the modulation transport circuit parameters with a dedicated analyzer that will be provided by the Purchaser.
3. Training: the Tenderer will provide training courses for installing, configuring and monitoring of the provided equipment for at least 5 persons from SNR.
4. The locations for which configuration and commissioning, acceptance and on site schooling will be done are:
   - SRR HeadquaetersBucharest Studio
   - București Herăstrău,
   - Cluj Feleac,
   - Iași Pietrăria,
   - TimișoaraUrseni.

CAP. IX. FINANCIAL OFFER

The tenderer shall complete Annex 1, taking into account the requirements of this document and annexes.

1. Quantitative reception will be made at the delivery addresses in Annex 3, in the presence of a team from the purchaser and will consist of:
   - Visual inspection (dimensions, construction elements).
   - Constructive verification (deformations, door opening angle, cable beds, etc.).
   - Checking the composition of the supply, etc.
   - Following the verification, a document of quantitative acceptance will be drawn up.

2. The final qualitative reception will be made for the equipment installed in the sites for which commissioning and acceptance tests will be carried out: Bucharest Herastrau, Cluj Feleac, Iasi Pietreia, Timișoara Urseni and Studio Central SRR Bucharest

3. The date of completion of the site acceptance report for the equipment installed in the above-mentioned sites, represents the date from which the technical support and the equipment warranty will take place.

4. For all other equipment, the date of completion of the quantitative acceptance report shall be the date from which the technical support and the equipment warranty will take place.

CAP. X. ANNEXES

Annex 1 - List of equipment, services with quantities and prices
Annex 2 - Modulation transport scheme.
Annex 3 -Equipment delivery addresses and warehouse distribution

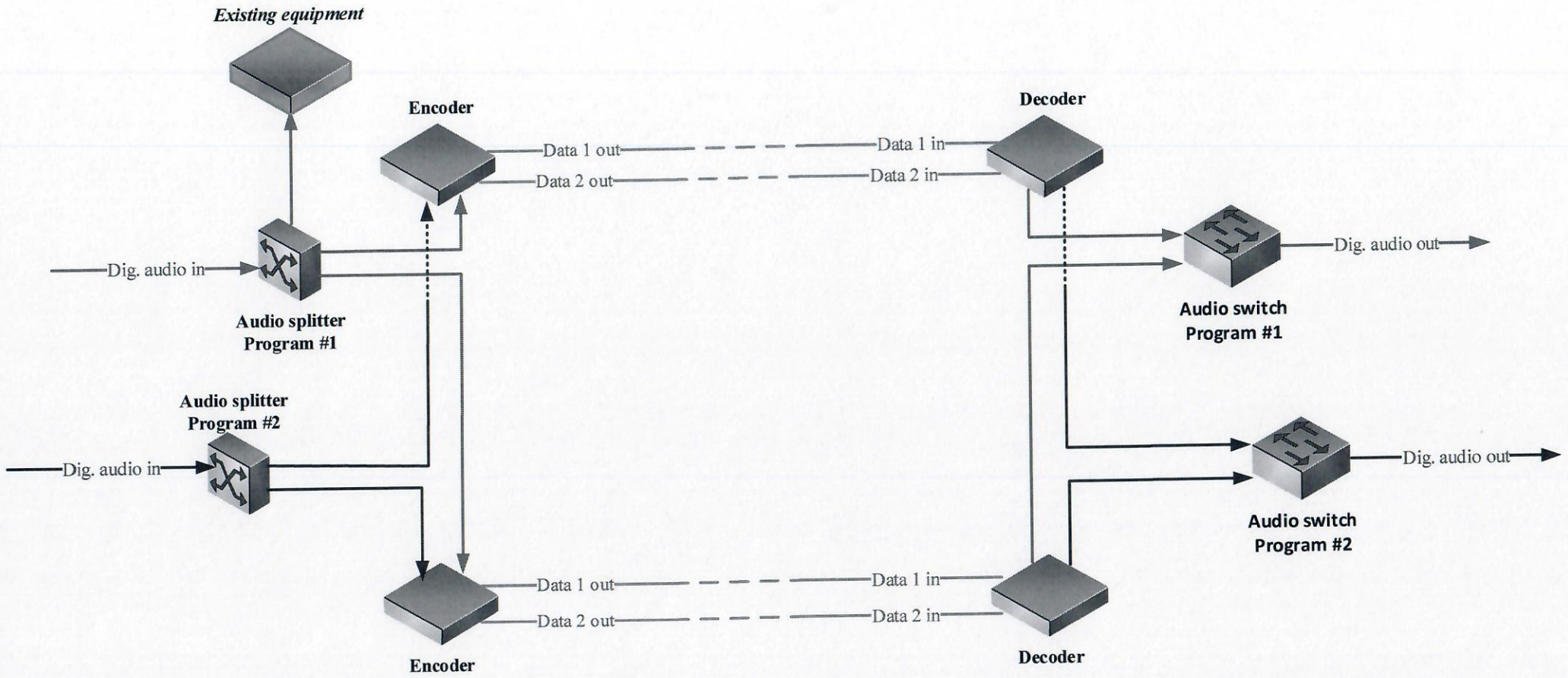
Adrian Abunei
Networking Department Manager

Silvian Mititelu
Head of Transmissions Service

Anexa 1 - Lista echipamente, servicii cu cantităţi şi preţuri

No.	Description	Product no	UM	Unit price [EUR]	Quantity		Total [EUR]
					Phase 1	Phase 2	*[4]*([5]+[6])*
[0]	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
1	**Product**		-	-	-	-	-
1.1	Audio encoder		pcs		36	36	
1.2	Audio decoder		pcs		52	206	
1.3	Audio splitter		pcs		18	18	
1.4	Audio switch		pcs		26	103	
					Subtotal 1		
2	**Spare parts**		-	-	-	-	-
2.1	Audio encoder		pcs		2	5	
2.2	Audio decoder		pcs		3	10	
2.3	Audio splitter		pcs		1	3	
2.4	Audio switch		pcs		2	7	
					Subtotal 2		
3	**Services**		-	-	-	-	-
3.1	Factory acceptance tests - 3 working days/5 persons		set		1	0	
3.2	Commisioning and site acceptance tests – 2 working days		set		2	3	
3.3	Trainning in site – 1 working day		set		2	3	
					Subtotal 3		
					GRAND TOTAL		

Anexa 3 – Schema transport modulatie



Anexa 3 – Equipemt delivery addresses and warehouse distribution

1. Magazia București - Str. Carpați, nr. 100, sector 1, București
2. Magazia Cluj - Str. Fagului, nr. 2, Cluj, Jud. Cluj
3. Magazia Iași - Str. George Enescu, nr. 7, Iași, Jud. Iași
4. Magazia Timișoara - Str. Aristide Demetriade, nr. 1, Timișoara, Jud. Timiș

Phase 1				
Warehouse	**Audio encoder**	**Audio decoder**	**Audio splitter**	**Audio switch**
Bucuresti	22	0	11	0
Cluj	0	0	0	0
Iasi	0	0	0	0
Timisoara	16	55	8	28
Total	*38*	*55*	*19*	*28*

Phase 2				
Warehouse	**Audio encoder**	**Audio decoder**	**Audio splitter**	**Audio switch**
Bucuresti	10	99	5	50
Cluj	26	65	13	33
Iasi	5	50	3	26
Timisoara	0	2	0	1
Total	*41*	*216*	*21*	*110*