

ANNEX II + III: TECHNICAL SPECIFICATIONS + TECHNICAL OFFER

Contract title: Supply contract for the “Implementation of Automated Import System (AIS), Automated Export System (AES) and Customs Decision System (CDS)”

Columns 1-2 should be completed by the contracting authority

Columns 3-4 should be completed by the tenderer

Column 5 is reserved for the evaluation committee

Annex III - the contractor's technical offer

The tenderers are requested to complete the template on the next pages:

- Column 2 is completed by the contracting authority shows the required specifications (not to be modified by the tenderer),
- Column 3 is to be filled in by the tenderer and must detail what is offered (for example the words ‘compliant’ or ‘yes’ are not sufficient)
- Column 4 allows the tenderer to make comments on its proposed supply and to make eventual references to the documentation

The eventual documentation supplied should clearly indicate (highlight, mark) the models offered and the options included, if any, so that the evaluators can see the exact configuration. Offers that do not permit to identify precisely the models and the specifications may be rejected by the evaluation committee.

The offer must be clear enough to allow the evaluators to make an easy comparison between the requested specifications and the offered specifications.

Unless otherwise specified, the requirements in these Technical Specifications are presented as a minimum standard which the offered goods must meet.

Short Technical Description:

The goal of this project is procurement the equipment and system software (licenses) needed for operational Implementation of **automated import system (AIS)**, including Special Procedures and Temporary Storage and **automated export systems (AES)** and **Customs decision management systems (CDMS)**.

Currently, the customs core export/import system **ISCS** is running on mainframe server “**IBM z15 8562 – T02**” and two “local” IBM AS/400 servers, which are all placed in the main server room in Belgrade. ISCS is operational since 1994. Technologically, the ISCS solution is proprietary and complex, leading to a long wait for new applications and high development and maintenance costs.

Improvements and innovation are needed to achieve effective and efficient operations. Three technology trends have been identified that could enable the evolution of ISCS¹:

- The first is to make services widely available and interoperable with the external ones, particularly EU information systems. The added value of CAS is no longer in hard-core technology, but in combining different components in a smart way, focusing on added value for the stakeholders;
- The second, long standing trend is pointing on the ISCS infrastructure. New paradigms in the CAS everyday work will be enabled with increased bandwidth and computing power;
- The third and final trend is service orientation which will enable the development of more loosely coupled information systems.

Current CAS ICT Strategy stated that new system will be built around the **Enterprise Service Bus (ESB) technology**.

New customs core system must be based on **industry standard X86 servers**, highly available, enterprise levels of reliability and availability and must not have a single point of failure.

All workloads **must be virtualized** and built around **SDDC (software-defined data center)** capable virtualization software/platform, so they can be decoupled of the underlay (physical) proprietary hardware vendors technologies. Offered solution must provide hypervisor and VMM -Virtual Machine Manager (Central administration console) covered with licenses for all offered virtualization hosts (x86 servers). Solution must offer antivirus protection for minimum 100 virtual servers - workloads. Solution must be capable to be expanded with Software defined storage and Software defined network in the future

All virtualization hosts (x86 servers) must be covered with **licences, for unlimited number of guest virtual machines**.

New **shared storage system** must be enterprise **unified storage platform** for block, file and vVol data with scale-out capability. Proposed shared storage system must consist of two identical storage arrays. Both will be installed in a central location, with the tendency for the second one to be moved to a DR location at the Government Datacentre in Kragujevac. Proposed shared storage system must be closely integrated with SDDC solution so that some new storage resources can be automatically provisioned from SDDC centralized management console.

All AIS, AES and CDMS workloads (up to 100 virtual machines) must be safely **backup and be ready for remote replication**. This requires a separate physical backup server, backup software and backup storage for backup destination. Software for backup virtual machines must be closely integrated with Virtualization

¹ Work plan for development and usage of electronic systems 2020-2024 (4.1 Key Directions)

platform and New High-end SAN storage system, to provide certain operations (snapshots) to be offloaded on storage directly (production is then minimally affected).

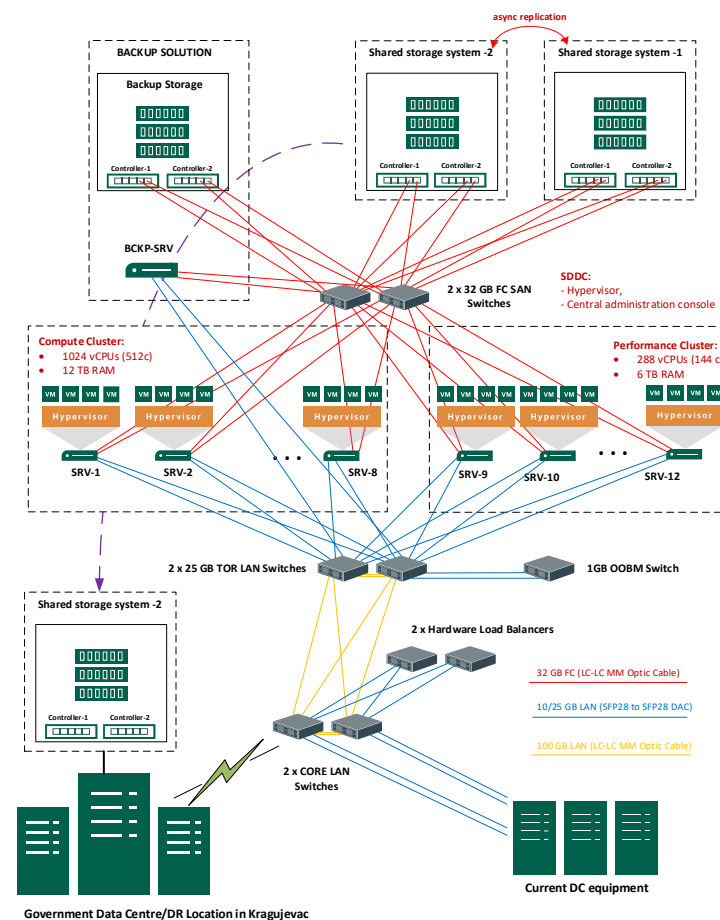
The current **CORE switches** on Customs Central Location (ERC) are two Cisco Catalyst 6509-E Chassis (presented as one single logical switch), with redundant supervisor engine cards, 10/100/1000 Ethernet line card, 10G fiber line cards, SFP-based Gigabit Ethernet line cards and 10G Multirate Interface Fiber line cards. Core L3 switches in Customs network interconnect Internet segment, WAN segment and Data Centre segment on Customs Central Location. Both switches are outdated. All new servers will be equipped with minimum 10/25GbE ports, and TOR switches will have 40/100Gbe uplinks. Current CORE switches must be upgraded with new card switches that have sufficient performance and bandwidth for new workloads. Beneficiary have also implemented “Cisco Prime” (Network Management Tool), licensed for 1000 network devices, which in terms of network service monitoring, provisioning, administration, and troubleshooting has full support for Cisco network devices in existing Customs network. **Offered network equipment required below must be compliant with existing solutions and protocols.** It is not expected to change any configuration or introduce any new protocols on devices in the network not affected by this supply. All rules and settings need to be migrated to the new CORE switches.

To increase capacity (concurrent users) and reliability of applications **two Application Load balancers** (Layer 4 and Layer 7), in active-active mode must be offered. Application Load balancers must be able to makes intelligent traffic management decisions, selecting the right destination based on server performance, security, and availability. Currently Customs is using the one “F5 VIPRION 2400” NLB with two blades VIPRION 2150. Offered Application Load balancers required below must be compliant with existing solutions and protocols. All rules and settings need to be migrated to the new NLB’s. The required application load balancers will work in HA mode, in new cluster. Existing CAS applications will be transferred to them, and they will also serve for new ones to be created for CAS (AIS, AES & CDS)

Customs plans to form a DR location at the Government Datacentre in Kragujevac. All equipment that is upgraded or replaced with equipment from this procurement can potentially be used at the DR location (CORE switches, NLB’s, etc).

SUMMARY OF NECESSARY EQUIPMENT

Item No	Item	Qty
1.1	Server Rack with equipment	2
1.2	Top-of-rack (ToR) switches	2
1.3	Network Out-of-Band Management (OOBM) switch	1
1.4	Compute Servers – virtualization hosts	8
1.5	Performance Servers – virtualization hosts	4
1.6	Backup Server	1
1.7	Fibre Channel SAN Switches	2
1.8	Shared SAN Storage System	2
1.9	Backup SAN Storage	1
1.10	SDDC (software-defined data center), guest OS and Antivirus	1
1.11	Backup software	1
1.12	CORE switches	2
1.13	Application load balancers	2
1.14	HW and SW Installation and configuration	1



1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.1	<p>Server Rack with equipment Qty. 2</p> <ul style="list-style-type: none"> Rack Size: 19" Height (Rack Units): 42U Dimensions (WxDxH): (600 mm) x (1070 mm) x (1991 mm) Perforated front and rear doors Quick release doors with simple lift-off design Half-Height Side Panels for easy handling and access to equipment Adjustable Vertical Mounting Rails. Rear Cable Channels for toolless mount PDUs and vertical cable organizers <p>Rack PDUs</p> <ul style="list-style-type: none"> Quantity: 2 Vertical, Zero U Output Connections: (20) x IEC 60320 C13, (4) x IEC 60320 C19 Input Connections: IEC 60309 32 A 2P + E Nominal Output Voltage: 230V Nominal Input Voltage: 200V, 208V, 230V Load Capacity: 7400VA Maximum Input Current: 32A Input frequency: 47 - 63 Hz <p>Vertical Cable Organizer</p> <ul style="list-style-type: none"> Quantity: 2 Zero U 8 Cable Rings <p>Horizontal Cable Organizer</p> <ul style="list-style-type: none"> Quantity: 2 Height: 1U <p>Blanking Panels</p> <ul style="list-style-type: none"> Quantity: min. 20 1U 19" Black Blanking Panel 			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.2	<p>Top-of-rack (ToR) switches Qty. 2</p> <p>Physical characteristics</p> <ul style="list-style-type: none"> • Type: L3, Datacentre switch • Chassis type: 1U, Rack mountable, including rack mounting kit • Minimum 48x1/10/25GbE SFP28 downlink ports • Minimum 4x 40/100GbE uplink ports • Console access: mini-USB and RJ-45 copper ports • Console cable with USB connector • Airflow: "front-to-back" • Power Supply: Redundant AC power supplies, dual, min. 650W • Power Cords: 2m (PDU 10A) <p>Performance</p> <ul style="list-style-type: none"> • Switching capacity: min. Up to 3.2 Tbps • Forwarding rate: min. Up to 1 Bpps <p>Cables and Transceivers (for each TOR switch)</p> <ul style="list-style-type: none"> • 1 x QSFP to QSFP copper direct-attach 100GBASE-CR4 cable, 1m • 2 x Transceiver, 100GBASE SR4 QSFP Transceiver, MPO, 100m over OM4 MMF • 2 x Fibre Cable, OM4, MMF, LC/LC, 50 Meter 			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.3	<p>Network Out-of-Band Management (OOBM) switch Qty. 1</p> <ul style="list-style-type: none"> Type: L2, Access switch Chassis type: 1U, Rack mountable, including rack mounting kit Minimum 24 x 10/100/1000 RJ45 - BASE-T downlink ports Minimum 4 x 1/10G SFP+ uplink ports Console access: RJ-45 copper port DRAM: min. 2 GB Flash: min. 4 GB Power supplies: min 2, 125W, AC, with power cords 2m (PDU 10A) Redundant fans to cool the switch VLANs: min. 4K Total number of MAC addresses: min. 16.000 Switching capacity: min. 128 Gbps Forwarding rate: 95 Mpps <p>Cables and Transceivers</p> <ul style="list-style-type: none"> 2 x Cable, SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 2,5 Meter (for connecting to ToR switches Item No. 1.2) 			

1.4	<p>Compute Servers – virtualization hosts Qty. 8</p> <p>Chassis and Power supply</p> <ul style="list-style-type: none"> • Form factor/height: Rack mount, max. 2U • Chassis Configuration: 2.5" Chassis with up to 8 Universal Drives (SAS/SATA or NVMe), • Power supply: minimum Dual, Hot-Plug, 1400W, • Power cords: 2 x Rack Power Cord 2m (C13/C14 10A) • Rails: Toolless, Sliding Rails • Ports: minimum 1 x USB-2.0, 1 x USB-3.0, 1 x VGA <p>Motherboard, CPU and Memory</p> <ul style="list-style-type: none"> • Number of DDR4 DIMM slots: min. 32 • Number of memory channels per CPU: min. 8 • Support for Up to 8 x PCIe Gen4 slots • CPU sockets: minimum 2 processor sockets supported • CPU generation: minimum 3rd Generation Intel Xeon Scalable processors or equivalent. • CPU Required number: 2 Pcs • CPU Clock rate: min. 2 GHz • CPU Number of cores per processor: min. 32 • CPU L3 Cache: min. 48 MB • Memory type. ECC DDR4 • Memory speed: min. 3200 MT/s • Memory Capacity: min. 1536 GB, (24 x 64 GB) <p>Storage configuration</p> <ul style="list-style-type: none"> • RAID controller with 4GB cache memory with ability to protect data in case of power failure. • RAID levels support: 0,1,5,6,10,50, 60 • HDD number: min 3 Pcs • HDD RAID level: RAID 1 + 1 spare disk • HDD type: SSD SATA Mix Use 6Gbps, Hot plug • HDD Capacity: 480GB <p>Network Interface Cards and Fiber Channel Host Bus Adapters</p> <ul style="list-style-type: none"> • Embedded NIC or any network adapter that does not occupy PCIe slots: min. 2 x 1 GbE 			
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1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	<ul style="list-style-type: none"> • PCI NIC's: 2 x Dual Port - SFP28. • FC HBA's: 2 x Dual Port 32Gb Fibre Channel HBA • Networking Cables: 4 x SFP28 to SFP28, 25GbE, Passive Copper Twinax Direct Attach Cable, 5 Meter (compatible with TOR switches Item No. 1.2) • FC Cables: 4 x OM4 LC/LC Multi Mode Fiber Cable, 5 Meter <p>Security features</p> <ul style="list-style-type: none"> • Trusted Platform Module 2 • Front Bezel • Cryptographically signed firmware • Secure Boot • Secure Erase • Silicon Root of Trust • System Lockdown <p>Embedded Management</p> <ul style="list-style-type: none"> • Separate, integrated 1GB Base-T module for monitoring and management of server and its components. Support for local and remote access via Graphic Web Interface (GUI). A remote access license included in the offer. • Web-based HTML5 GUI. • Health Monitoring. • Power control, Boot control, • Virtual Media, Virtual Folders • Virtual Console, HTML5 access to Virtual Console • Email Alerting • Real-time power meter • Temperature monitoring 			

1.5	<p>Performance Servers – virtualization hosts Qty. 4</p> <p>Chassis and Power supply</p> <ul style="list-style-type: none"> • Form factor/height: Rack mount, max. 2U • Chassis Configuration: 2.5" Chassis with up to 8 Universal Drives (SAS/SATA or NVMe), • Power supply: minimum Dual, Hot-Plug, 1400W, • Power cords: 2 x Rack Power Cord 2m (C13/C14 10A) • Rails: Toolless, Sliding Rails • Ports: minimum 1 x USB-2.0, 1 x USB-3.0, 1 x VGA <p>Motherboard, CPU and Memory</p> <ul style="list-style-type: none"> • Number of DDR4 DIMM slots: min. 32 • Number of memory channels per CPU: min. 8 • Support for Up to 8 x PCIe Gen4 slots • CPU sockets: minimum 2 processor sockets supported • CPU generation: minimum 3rd Generation Intel Xeon Scalable processors or equivalent. • CPU Required number: 2 Pcs • CPU Clock rate: min. 3 GHz • CPU Number of cores per processor: min. 18 • CPU L3 Cache: min. 39 MB • Memory type. ECC DDR4 • Memory speed: min. 3200 MT/s • Memory Capacity: min. 1536 GB, (24 x 64 GB) <p>Storage configuration</p> <ul style="list-style-type: none"> • RAID controller with 4GB cache memory protecting data in case of power failure. • RAID levels support: 0,1,5,6,10,50, 60 • HDD number: min 3 Pcs • HDD RAID level: RAID 1 + 1 spare disk • HDD type: SSD SATA Mix Use 6Gbps, Hot plug • HDD Capacity: 480GB <p>Network Interface Cards and Fiber Channel Host Bus Adapters</p>			
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1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	<ul style="list-style-type: none"> • Embedded NIC or network adapter that does not occupy PCIe slots: min. 2 x 1 GbE • PCI NIC's: 2 x Dual Port - SFP28. • FC HBA's: 2 x Dual Port 32Gb Fibre Channel HBA • Networking Cables: 4 x SFP28 to SFP28, 25GbE, Passive Copper Twinax Direct Attach Cable, 5 Meter (compatible with TOR switches Item No. 1.2) • FC Cables: 4 x OM4 LC/LC Multi Mode Fiber Cable, 5 Meter <p>Security features</p> <ul style="list-style-type: none"> • Trusted Platform Module 2 • Front Bezel • Cryptographically signed firmware • Secure Boot • Secure Erase • Silicon Root of Trust • System Lockdown <p>Embedded Management</p> <ul style="list-style-type: none"> • Separate, integrated 1GB Base-T module for monitoring and management of server and its components. Support for local and remote access via Graphic Web Interface (GUI). A remote access license must be included in the offer. • Web-based HTML5 GUI. • Health Monitoring. • Power control, Boot control, • Virtual Media, Virtual Folders • Virtual Console, HTML5 access to Virtual Console • Email Alerting • Real-time power meter • Temperature monitoring 			

1.6	<p>Backup Server Qty. 1</p> <p>Chassis and Power supply</p> <ul style="list-style-type: none"> • Form factor/height: Rack mount, max. 1U • Chassis Configuration: 2.5" Chassis with up to 8 Drives (SAS/SATA), • Power supply: minimum Dual, Hot-Plug, 800W, • Power cords: 2 x Rack Power Cord 2m (C13/C14 10A) • Rails: Toolless, Sliding Rails • Ports: minimum 1 x USB-2.0, 1 x USB-3.0, 1 x VGA <p>Motherboard, CPU and Memory</p> <ul style="list-style-type: none"> • Number of DDR4 DIMM slots: min. 16 • Number of memory channels per CPU: min. 8 • Support for Up to 3 x PCIe Gen4 slots • CPU sockets: minimum 1 processor sockets supported • CPU generation: minimum 3rd Generation Intel Xeon Scalable processors or equivalent. • CPU Required number: 1 Pcs • CPU Clock rate: min. 2,4 GHz • CPU Number of cores per processor: min. 16 • CPU L3 Cache: min. 24 MB • Memory type. ECC DDR4 • Memory speed: min. 3200 MT/s • Memory Capacity: min. 64 GB, (8 x 8 GB) <p>Storage configuration</p> <ul style="list-style-type: none"> • RAID controller • RAID levels support: 0,1,10 • HDD number: min 3 Pcs • HDD RAID level: RAID 1 + 1 spare disk • HDD type: SSD SATA Mix Use 6Gbps, Hot plug • HDD Capacity: 480GB <p>Network Interface Cards and Fiber Channel Host Bus Adapters</p> <ul style="list-style-type: none"> • Embedded NIC or any network adapter that does not occupy PCIe slots: min. 2 x 1 GbE • PCI NIC's: 1 x Dual Port - SFP28. 			
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1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	<ul style="list-style-type: none"> FC HBA's: 1 x Dual Port 32Gb Fibre Channel HBA Networking Cables: 2 x SFP28 to SFP28, 25GbE, Passive Copper Twinax Direct Attach Cable, 5 Meter (compatible with TOR switches Item No. 1.2) FC Cables: 2 x OM4 LC/LC Multi Mode Fiber Cable, 5 Meter <p>Security features</p> <ul style="list-style-type: none"> Trusted Platform Module 2 Front Bezel Cryptographically signed firmware Secure Boot Secure Erase Silicon Root of Trust System Lockdown <p>Embedded Management</p> <ul style="list-style-type: none"> Separate, integrated 1GB Base-T module for monitoring and management of server and its components. Support for local and remote access via Graphic Web Interface (GUI). A remote access license included. Web-based HTML5 GUI. Health Monitoring. Power control, Boot control, Virtual Media, Virtual Folders Virtual Console, HTML5 access to Virtual Console Email Alerting Real-time power meter Temperature monitoring 			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.7	<p>Fibre Channel SAN Switches Qty. 2</p> <p>Chassis and Power supply</p> <ul style="list-style-type: none"> Chassis type: 1U, Rack mountable, including rack mounting kit Number of Fibre Channel Ports: 48 SFP+ ports and 4 QSFP ports Number of Active Fibre Channel Ports: 48 Number and speed of shortwave SFPs: populated with 48 x 32Gb shortwave SFPs Airflow: Rear to Front Power supplies: Dual power supplies Power Cords: 2M (C13/C14 10A) <p>Performance and capabilities</p> <ul style="list-style-type: none"> 32Gb/s SFPs must operate at 32, 16 or 8 Gb/s Frame Buffers: min. 15,360 dynamically allocated Aggregate Bandwidth: min. 2Tb/s <p>Management</p> <ul style="list-style-type: none"> Management access: 10/100/1000 Mb/s Ethernet (RJ-45), In-band over Fibre Channel, Serial port (RJ-45), and one USB port Management: Advanced Web Tools. SSH, Auditing, Syslog NTP v3, CLI, SMI-S compliant; REST API, HTTP, SNMP v1/v3 			

1.8	<p>Shared SAN Storage System Qty. 2</p> <ul style="list-style-type: none"> Storage system type: All-flash, NVMe Storage system must utilize dual active-active storage nodes (controllers). Platform: Unified storage platform for block, file and vVol data with or without utilising additional or external device Storage growth: Scale-up (by adding disks/disk shelves) and Scale-out (by adding Storage system, minimum up to four, in cluster). The storage system must have redundant hardware components, without a single point off failure, with the ability to tolerate individual power failure, controller (storage node), disk, and support for Hot-Swap components. Support for data migration between storage appliances in the cluster without interruption. Storage system with always-on mechanism of deduplication and data compression with hardware acceleration. Hardware acceleration is accomplished using hardware or combination of hardware and software. Hardware could be in form of card, chips or even additional CPU cores dedicated for compression and deduplication. Supported protocols for block: FC, NVMe-FC, iSCSI, NVMe/TCP, and VMware Virtual Volumes (vVols) 2.0. Support for adding storage class memory (SCM) based disks for permanent data storage. Support for dynamic RAID or equivalent technology that eliminates the need for a classic hot-spare disk; expansion of system with single-disk. Local Protection: Data at Rest Encryption, self-managed key management, Local Point-In-Time Copies (Snapshots and Thin Clones) implemented with a redirect-on-write mechanism. CPUs per Storage system: min. 4 x Intel CPUs, 64 cores, 2.1 GHz or equivalent 			
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	<ul style="list-style-type: none"> Storage system Memory Capacity: 1 TB (512 GB Per Node/Controller) Storage system RAW capacity: minimum: 115 TB NVMe SSD System includes recommended number of hot-spare drives with at least capacity of one drive for spare purposes. Storage system delivered with minimum 260 TB effective (with up to 3:1 data reduction) with Dynamic RAID protection. Front End ports minimum: 8 x 25 GBE Optical and 8 x 32 GB FC Networking Cables: 4 x SFP28 to SFP28, 25GbE, Active Optical Cable, length between 5m and 10m, including 5m and 10m, (compatible with TOR switches Item No. 1.2) or network transceivers and cables on both sides of communication. FC Cables: 8 x OM4 LC/LC Multi Mode Fiber Cable, 5 Meter Power Supply: Dual (200-240V), includes C13/C14 Power Cords. The offered power supply is sufficient to support the chassis with maximum loaded disks and IO controllers. Max Performance for current configuration: min. 270 K IOPS / 2200 MB/s (Rand: 70% 8.19 KB Read / 30% 8.19 KB Write) All Inclusive Base Software (no additional licenses required) Storage system should have Web (HTML 5) base management interface. Ability to manage via console and via REST API Ability to monitor the system through a cloud (SaaS) based service via web browser. The service must enable monitoring of performance (Latency, IOPS, Bandwidth, IO Size, Queue Depth), capacity utilization, storage system components as well as to perform predictive analysis and proactively monitor the correctness of the system 			
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1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.9	<p>Backup SAN Storage Qty. 1</p> <ul style="list-style-type: none"> Storage system type: hybrid, block storage Chassis: 3.5" drive slots Controllers: 2 hot-swappable per chassis (dual active) System memory: min. 8GB per controller Back-end: 12Gb SAS. Front-end per controller: 4x16Gb FC (with SFP+ modules) FC Cables: 4 x OM4 LC/LC Multi Mode Fiber Cable, 3 Meter Max drive count with expansion enclosures: The maximum number of disks in the system must be expandable by at least three times capacity of offered hard disks Disk drives support: SSD, 10K and NLSAS drives (including FIPS-certified SEDs) System must be delivered with minimum: 84 x 4TB HDD 7.2K SAS12. The bidder/tenderer is allowed to provide the required capacity with different hard disk configuration, but the maximum capacity of a single hard disk must not exceed 6TB. RAID support: RAID 1, 5, 6, 10, 50 or Adapt (Distributed erasure coding that reduces rebuild times when drive failures occur) Thin provisioning: Supported on all volumes, operates at full performance across all features Management: HTML5 GUI, CLI Data-at-rest encryption: Self-encrypting drives (SEDs) in SSD or HDD formats <ul style="list-style-type: none"> Power Supply: Redundant, 2200W, includes C13/C14 Power Cords. 			

1.10	<p>SDDC (software-defined data center), guest OS and Antivirus Qty. 1</p> <p>Server operating system - hypervisor</p> <ul style="list-style-type: none"> • Perpetual (permanent) license for 12 servers (Item No. 1.4 and 1.5) with up to 2 processors each. • Hypervisor or host-based implementation. • Ability to move an entire running virtual machine from one physical server to another, with no downtime. • Ability to move running virtual machine's (VM) file system from one storage system to another, with no downtime for the VM or service disruption for end users. • In case of server (host) failure, ability to initiate the process of restarting all affected virtual machines on other hosts. • Live Snapshots - allow a user to take a snapshot of a virtual machine while the guest is running, thus preserving the state and data of a VM at a specific point in time. • Role-based access control (RBAC), Active Directory (AD) integration • Support for storage types: <ul style="list-style-type: none"> • Fibre Channel • iSCSI • FCoE • NAS (NFS) • All virtualization hosts (Item No. 1.4 and 1.5) must be covered with licences, for unlimited number of guest virtual machines. <p>Single centralized management console</p> <ul style="list-style-type: none"> • Perpetual (permanent) license for 12 servers (Item No. 1.4 and 1.5) with up to 2 processors each. • Allows installation in the form of virtual appliance. • Provides centralized administration. 			
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1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	<ul style="list-style-type: none"> Provides search the inventory of objects. Provides alert and send notifications. <p>Antivirus - protection for virtualized workloads</p> <ul style="list-style-type: none"> 1 Year subscription license for 100 virtual endpoints Endpoint protection Centralized management (management console) Anti-Phishing Use of machine learning or AI Firewall 			

1.11	<p>Backup software Qty. 1</p> <ul style="list-style-type: none"> • Backup software should protect minimum 100 Customs virtual machines. • Backup software should be offered with a permanent license. • The offered solution must have a system for monitoring the virtual and backup environment, sending alarms and alerts to system administrators and the ability to generate reports, predefined or created by users. • Backup software specially optimized for virtual environment with support for VMware and Hyper-V and KVM environments backup. • Backup at the virtual machine level. During the backup, the backup of configuration files and virtual disks of virtual machines should be done. • Support for "application aware backup" (Microsoft Active Directory, Microsoft SQL Server, Microsoft Exchange, Microsoft Share Point) which ensures consistency of application data at the operating system level. • "Restore" at the virtual machine level, "guest" file, "application" file, virtual machine configuration file, etc. • Ability to start a virtual machine directly from the backup without having to restore it first. • Support for FC connectivity which enables "LAN-free" backup. • Support for running virtual machines from backups on production hosts (fully managed by backup server) in an isolated environment (SandBox) independent of production, in order to verify backups and data consistency, as well as the ability to test new patches in an isolated environment • Virtual machine replication support: <ul style="list-style-type: none"> - Ability to restore (Restore) from a replicated machine, - Ability to predefine the Failover plan, 			
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	<ul style="list-style-type: none"> - It should include the options of permanent “failover” and planned “failover”. • Support for the possibility of integration with storage "snapshots", ie. creating backup copies of data based on storage snapshots from EMC, NetApp, HPE, Cisco HyperFlex... • Support for optimizing data transmission over WAN links that reduces the amount of data transmitted over WAN links using the deduplication mechanism and global "cache" which eliminates the transfer of data to a remote location located in the "cache". • Support for an integrated agent that can connect to leased resources from a cloud provider certified by a backup software vendor and thus expand its capacity and use the same capacity to store offline backup data as well as replicate virtual machines. • Support for "off-host" backup where the backup process is performed on a separate host which does not impose load on the source virtualization host. • "Backup Copy" - Copying backed up files to a secondary storage (backup repository); • Support for integration with Tape drive. • Support for creating "synthetic full" backup files. The ability of backup software to make a "full" backup copy of data based on existing "full" backup and incremental files from the backup repository without burdening the production storage. • Deduplication and compression of backup files. • Sending event notifications to notify the backup administrator in cases such as failed operations or interrupted operations. • Ability to save backup files on local disks of servers on which backup software is installed. <ul style="list-style-type: none"> • Support for SQL database recovery based on transaction logs. 			
1.12	CORE switches Qty. 2			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	<p>Chasis characteristics</p> <ul style="list-style-type: none"> • Type: Enterprise modular L3 switch • Total number of expansion slots: min 6 • Switch (port) slots: min 4 • Main Processing Unit (supervisor) slots: min. 2 • Rack mountable, including rack mounting kit <p>Main Processing Unit (Supervisor) (Qty. 2 per switch)</p> <ul style="list-style-type: none"> • DRAM: min. 16 GB • Flash: min. 8 GB <p>Performance per switch</p> <ul style="list-style-type: none"> • System Switching Capacity support: min. 9.6 Tbps • Forwarding rate: min. up to 3 Bpps <p>Line Cards must provide minimum following ports (per switch):</p> <ul style="list-style-type: none"> • 12 x 100 GE QSFP28 ports • 48 x 10GE, 1 GE, SFP+ ports • 48 x 10GE, 1GE, RJ45 Copper (Base-T) ports <p>Cables and Transceivers (for each CORE switch)</p> <ul style="list-style-type: none"> • 2 x QSFP to QSFP copper direct-attach 100GBASE-CR4 cable, 2m • 12 x 100GBASE SR4 QSFP Transceiver, MPO, 100m over OM4 MMF • 48 x 10GBASE-SR SFP + Transceivers, 850nm Wavelength, 300m Reach • 6 x Fibre Cable, OM4, MMF, LC/LC, 50 Meter 			

1.13	<p>Application load balancers Qty. 2</p> <ul style="list-style-type: none"> • System memory (RAM): min. 48 GB DDR4. • 10 Gigabit capable Fiber Ports (SFP+): min. 8 (SR or LR or 10G copper direct attach). With each application load balancer, it is necessary to deliver two passive DAC cables of 5 m compatible with the CORE switches (Item No 1.12) or corresponding SFP+ transceivers on both sides and an LC-LC multimode optical cable of 5 m. • Throughput L4: min. 60 Gbps • Throughput L7: min. 35 Gbps • L7 requests per second: min. 800.000 • L4 connections per second: min 800.000 • L4 Concurrent connections capacity: min. 40.000.000 • SSL transactions per second TPS (2048-bit keys): min. 35.000 • SSL bulk encryption throughput: min. 20 Gbps • Hardware Compression: min. 8.5 Gbps • Power Supply: redundant, hot-swappable • Must include WebGUI device configuration mode over secure SSL connection • Must include support for command-line device configuration via secure connection • The system must be able to be operated locally without the need for a central management system • Possibility of administrator authentication using external authentication mechanisms (such as LDAP, RADIUS, RSA SecureID or equivalent professional two-factor authentication mechanisms) • The system must support for static and dynamic NAT / PAT • The system must support sending notifications to external systems using APIs or non-proprietary protocols • The system must support high availability configurations 			
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	<ul style="list-style-type: none"> • The system must support HA in L3 / routed mode in the ACTIVE / ACTIVE configuration • The system must support HA in L3 / routed mode in the ACTIVE / STANDBY configuration • Support for “sync” configurations between devices in the system • Support for transparent failover or HA or equivalent. • Ability to analyse problems on the system using the following methods: <ul style="list-style-type: none"> - DNS lookup or nslookup - PING - traceroute - ping - packet capture • Ability to export “tcpdump” analysis or packet capture analysis • 802.1q support • Support for 802.3ad link aggregation • Ability to monitor the system in real time and filter information • Support for defining different levels of administrator access to the system • Support for IPv4 and IPv6 protocols • Support for traffic translation between IPv4 and IPv6 protocols and vice versa or packet forwarding methods NAT46 and NAT64. • Support for the following protocols: TCP, UDP • Support for session persistence methods: Cookie, Hash, SIP, SSL, Source IP, Destination IP, Microsoft Remote Desktop Protocol; the possibility of defining an arbitrary method of persistence • Packet filtering support • Support for the following L7 protocols: HTTP 1.0, HTTP 1.1, HTTP / 2, WebSockets, FTP (active / passive), SMTP, LDAP, , RADIUS, SIP • Support for policy-based traffic management • SNAT support • Support for NAT and PAT 			
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1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	<ul style="list-style-type: none"> • Support for the following traffic allocation methods: <ul style="list-style-type: none"> - Round robin - Least connection - Ratios • Support for scripting language for intercepting, viewing and transforming application traffic included • Support for logging information on remote systems • Ability to integrate with existing provisioning systems through a programmable API 			

1.14	<p>HW and SW Installation and configuration</p> <p>HW Installation and configuration</p> <ul style="list-style-type: none"> • Required hardware management IP addresses and Operating system management IP addresses must be asked in advanced and provided by the Beneficiary. • Rack, PDU and Horizontal and Vertical Cable Management installation. Connecting PDU's to Customs power sockets provided by the Beneficiary. • Installing TOR switches and OOBM switches in rack. • Configuring switches according to the Beneficiary instructions. • Install FC SAN switches in rack. • Configure management IP addresses for FC switches and initialize them. • Server installation in rack. Connecting LAN, OOBM and SAN cables. • Configuring server management IP addresses. • Installing operating system (hypervisor) on servers and configuring OS management IP address. • Install Shared SAN Storage systems in rack. Connecting LAN, OOBM and SAN cables. • Install Backup Storage systems in rack. Connecting OOBM and SAN cables. • Configure management IP addresses and initialize all storage systems. • Configure zoning on FC switches (aliases, zones, zone-sets...). • Create LUN's (min. four LUNs per 100 GB) and configure hosts (server) access on storage system. • It is the Contractor responsibility to provide LLD (Low Level Design) documentation and deliver to Beneficiary in electronic form and in hard copy. 			
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1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	<p>Virtualization software/platform installation and configuration Required IP addresses for all services for Virtualization software/platform must be asked in advanced and provided by the Beneficiary. It is the Contractor responsibility to install and configure all required and proposed virtualization management components. Contractor will install and configure virtualization software on servers (item 1.4 and 1.5) and create virtual machines. All configuration parameters such as allocation of virtual CPUs, RAM, virtual disk space, vNIC to each virtual machine are subject of proposed software solution design.</p> <p>Network migration to new CORE switches</p> <ul style="list-style-type: none"> • Extract current CORE switches configuration. • Installing and cabling new CORE switches in rack. • Migrate (and renew/convert) old configuration to new CORE switches • Test network functionality • Additional configuring switches according to the Beneficiary instructions. <p>Migration to new NLB's</p> <ul style="list-style-type: none"> • Extract current NLB's configuration. • Installing and cabling new NLB's in rack. • Migrate (and renew/convert) old configuration to new NLB's • Test Application functionality • Additional configuring NLB's according to the Beneficiary instructions. 			

1.15	<p>GENERAL REQUIREMENTS</p> <p>Power Supply Standard All electrical equipment must be powered with 230V, 50Hz AC and must be equipped with C13-C14 power cords. The equipment must be suited for operation under Central European land climate and weather conditions without requiring a special preparation process. The equipment must comply to IEC 60 529 standard for indoor IT equipment operating under temperature range of 10°C – 40°C, relative humidity range of 20% – 80% and IP 20 protection level, and must have RoHS certificate and comply to CE, WEEE standards.</p> <p>Installation, Configuration and Start-up The Tenderer must include in their offer a complete set of required cables, patch cords, power cords, Ethernet cables, appropriate FC cables, accessories and other physical modules required for the proposed equipment/system to operate in accordance with specifications. Delivered servers must be equipped with all necessary items for installation and start-up: e.g., rack rails and hardware, cable management hardware, intra-rack cables, documentation CD, etc.</p> <p>The Contractor will be responsible for installation, configuration and start-up of the supplies delivered in accordance with the Technical Specifications and the directions provided by the Beneficiary. Cable management is mandatory. All cables must be labelled on both ends according to the Contractor proposition and Beneficiary approve. The Contractor will be responsible for integration of the supplies delivered with the existing infrastructure. The installation services must be performed by personnel having relevant Vendor certifications.</p> <p>Place of Delivery</p>			
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	<p>The Supplies are to be delivered to and services are to be carried out in the CAS Headquarters 2 (ICT Division) located in Belgrade 11070, Narodnih Heroja 63.</p> <p>Post-Completion Documentation The Contractor will be responsible for preparation of Technical Post-Completion Documentation describing the system implemented. It should include graphical description of interconnection between various elements, all hardware and software configuration details, start-up scripts and a description of mandatory maintenance procedures to be followed by the Beneficiary during day-to-day operation of the equipment. The Post-completion Documentation will subject to the approval of the Beneficiary.</p> <p>Training The Contractor must provide the education necessary for CAS staff to be fully trained on the usage and maintenance of delivered solution SDDC (Software Defined Datacentre). All training materials must be packaged for electronically delivery and accessible for on-demand requests. Training should include minimum 5 days for up to 10 persons. Training should be official for proposed SDDC solution and organized by certified professionals. The training system must include full documentation (localised into Serbian or English).</p> <p>Warranty</p> <p>Warranty: Minimum 1 year</p> <ul style="list-style-type: none"> • Warranty starts from the date of issuance of Provisional Acceptance Certificate. • Contractor must provide local reliable warranty service agent providing maintenance and the rapid supply of equipment spare parts for the Warranty duration. 			
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	<ul style="list-style-type: none"> Detailed description of the organization of the proposed service and description of the warranty shall be included in the offer. <p>Commercial warranty: Minimum 2 years.</p> <ul style="list-style-type: none"> Commercial warranty starts from the date of issuance of Final Acceptance Certificate. Detailed description of the organization of the proposed service and description of the commercial warranty shall be included in the offer. <p>The warranty (duration, expiration date and type) must be verifiable on the equipment manufacturer's website by device serial number or service tag.</p> <p>Support & maintenance requirements during warranty and commercial warranty period</p> <p>The following activities/operations shall be assured during the warranty and commercial period:</p> <ul style="list-style-type: none"> Maintenance regarding the supplied equipment/software in the agreed parameters (performance, availability, and data integrity etc.). Improvements to the technical performances if the case. Solving bugs that have not been identified during the implementation and which occur during the production stage. The Tenderer shall provide Help Desk support (phone & e-mail), available minimum during working hours (8h–17h local time) during the warranty and commercial warranty period. The Tenderer shall repair defects or damages at his own cost during the warranty and commercial warranty period. Registering and tracking problems shall take place using a dedicated software application for incident and problem management provided by the Tenderer. 			
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1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	<ul style="list-style-type: none"> The application for the registration and tracking of problems shall be also used for the management of issues and events that occur in the implementation stage of the project. During warranty and commercial warranty period, the Tenderer shall repair or alternatively replace the defective equipment. During warranty and commercial warranty period, the Tenderer shall fully replace equipment in case the defect or damage that cannot be repaired. <p>Minimum Service level requirements (SLR) are stated in the table below:</p>			

Severity Level	Definition	TRT	TF	TNB
Priority 1 – major operational impact	Critical functions are not available. Critical service (application mode) is not available. General activity is significantly disturbed.	1 hour	1 days	1 week
Priority 2 – significant operational impact	Significant operational impact on the activity of many users.	1 hour	2 days	1 week
Priority 3 - minor operational impact	Medium/Minor operational impact on the activities. It affects a user or computer service (function) with little impact. Activity can take place almost normally.	1 day	1 week	2 weeks
Priority 4 - Information request	Information request. There is no operational impact. The production activity is not affected.	2 days	2 weeks	5 weeks

NOTE:

- **TRT = Time to React or Response Time (Acknowledge Time):**

Time expressed in working hours between the time support provider received notification of the error and the time client was informed on notification being received.

- **TF = Time to Fix (workaround or final solution) or Resolution time:**

Time expressed in working hours or days between the time support provider receives validated Service Request and the time response on the resolution is sent to the beneficiary Priority or Severity Level – How important the reported incidents are in relation to the system based on the affected functionality and business impact.

- **TNB = Time until the new build:**

Amount of time required for Contractor to provide a new patch or build that implement a resolution for the incident.

If remote connection is not available by a cause which is out of Contractors responsibility, the Work-around Time for severity level “Priority1” shall be 2 days