CONCEPT
Staged Creation and Development of a Unified Information Space for Customs Administrations of the Customs Cooperation Committee Member-Countries

1. General Provisions

This Concept was developed in order to implement the Common Action Plan, endorsed by the Customs Cooperation Committee (CCC), as well as decisions made by the Third CCC Meeting on the issues of regional customs cooperation development, which took place in Baku, Azerbaijan on December 1-3, 2004 and which brought together representatives of Customs Administrations of Azerbaijan, Kazakhstan, PRC, Republic of Kyrgyzstan, Mongolia, Uzbekistan, Tajikistan and Turkmenistan.

The Concept defines key principles of design and structure of a unified information space (UIS) of the CCC member-countries' Customs Administrations, as well as the UIS technical environment and stages of its development.

The goal of the CCC is to promote cooperation between the Customs Administration in the region, facilitate external trade and modernize customs procedures.

Foundations for interaction between the CCC member-countries were laid in the CCC Agreement in January 2002, in Mutual Administrative Assistance Agreements and other intergovernmental and interagency agreements, both multilateral and bilateral.

In order to implement provisions of documents signed by the CCC member-countries, the Customs Administrations carry out activities aimed at the simplification of customs procedures, improvement of customs control mechanisms, increasing efficiency of customs regulation mechanisms for foreign trade, modernization of information technologies and automated information systems.

Given that customs policy is a critical component of economic policy of any country, the current international globalization processes requires its constant development, modernization and improvement, as well as an increased level of mutually beneficial cooperation between the Customs Administrations.

Integration of Customs Administrations of individual countries implies for a number of challenges, which can not be addressed by the countries in isolation.

The intergovernmental relations development in frames of the CCC, deepening of external economic relations require coordinated and well-directed efforts in such important areas as joint customs controls, data sharing, transit development and creation of an adequate regulatory framework for customs activities in each CCC member-country, and, consequently, ensuring the availability of adequate customs information.

The necessity to ensure efficient development of current external economic relations puts forward the issues related to the implementation of a new approach to customs service development.

A rational and cost-efficient solution for this objective would be the implementation of a number of measures aimed at the improvement of customs clearance procedures, increased efficiency of customs controls and customs intelligence based on application of new information technologies, creation of new and development of existing hardware and software.

One of directions, envisaging further development, both to facilitate favorable environment of a nation's external trade and to increase efficiency of customs controls, is the organization of an informational interaction on various aspects of customs operations between the Customs Administrations of individual countries.

Interaction into the global economic system is closely related with strengthened performance of the CCC member-countries' Customs Administrations, which can be achieved through the implementation of a fundamentally new level of data sharing on key areas of customs activities and through ensuring integration of information resources of the CCC member-countries' Customs Administrations.

Foundation for this would be the creation of a unified information space for the Customs Administrations, which would ensure an automated sharing and processing of coordinated volumes of data from information resources of each CCC member-country, as well as authorized, efficient and easy access to such resources.

2. Unified Information Space Building Principles and Structure

Information space of an individual nation's Customs Service reflects in general nature of its customs operations and structurally encompasses the following components:

- External trade nomenclature – a range of goods and service, which are subject for foreign trade and subject to customs regulation and control;
- Types of customs regimes, ensuring individual specific norms and rules of customs regulation;
- Areas and measures of customs regulation of external trade (tariff and non-tariff regulation);
- Customs payments and preferences;
- Types of customs controls for each area of customs regulation;
- Measures to prevent and repress smuggling and other customs offences;
- Aggregate actual data on customs operations.

Each component of the information space is implemented in form of a set of regulatory and legal documents, classifying reference books and data files created based on these documents.

The information space can be embodied both in paper format and in electronic format. The electronic representation of the information space is a result of implemented automated information technologies, which are to be created according to regulatory and legal documents regulating individual components of customs activities, and which present a set of algorithms and software programs implemented in an appropriate technical environment.

Technical environment is a totality of computer facilities, including software, telecommunication and communication systems and facilities.

At current period of development, for which an intensive improvement of technical facilities and information technologies is typical, the "center of gravity" in development and improvement of customs service steadily shifts towards automated customs information technologies, and the share of electronic representation of information space is constantly increasing.

The unified information space of the CCC member-countries' Customs Administrations is a conjugation of information spaces of each CCC member-country. Here, the conjugation should not be considered as a mere connection of information spaces, but rather as another level of a new information space, which would imbibe features of its structural elements. Unique characteristics of economic development of the countries, structures of their industrial production and external trade, geopolitical particularities, existing level of automated customs technologies and technical facilities available with the Customs Administrations of individual countries, priorities of national policies, availability of resources for development of new information technologies for the customs, - all these predefines the necessity to apply a long-term and staged approach to the integration of information resources.

A "measure of entry" to the unified information space is to be determined on a voluntary basis by each CCC member-country. The "measure of entry" should be understood as a repertoire of data received by the customs in the UIS, which will be equivalent to repertoire of data given by the customs to the UIS. At the same time, some part of the integrated information can, upon a mutual agreement, be open for all the parties, regardless of how big a development contribution was on behalf of each of the customs administration.

A required prerequisite for the conjugation of information spaces of the Customs Administrations into a single unified information space is the application of modern information and technical technologies.

3. Technical Environment of the Unified Information Space

Technical environment of the unified information space is designed for ensuring mutual data sharing between the Customs Administrations. Here, the technical environment does not cover the whole of information and technical facilities, used in the CCC member-countries' customs services. According to its purpose, the technical environment of the unified information space consists of computer facilities, including software, and telecommunication and communication facilities, which ensure data interchange based on coordinated fields, structure, formats and standards of data transmission. At the same time, requirements to information efficiency, accuracy and security should be met at data sharing.

One of critical elements of the technical environment of the unified information space is software. Since types and structure of data included in the UIS will be constantly changing and increasing, a needed condition for developing a unified system of software will be its feasible adaptation to such changes with a minimum time and financial costs.

The UIS technical environment should be based on modern information technologies and equipment. This implies that in the development of the UIS application software all required current technologies will be used: web-technologies, database building and management, EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) data transmission standards and other methods and technologies.

3.1. Server Platform

When creating the unified information space of the CCC member-countries' Customs Administration, special attention should be given to selection of a server platform. Since all of the eight CCC member-countries have their own customs information systems, created based on various platforms and using various databases, the unification of shared data will be a priority objective. The issues related to operation stability, data reliability and safety (security) within the created unified information space and unification of transmitted data will arise.

When creating the unified information space, the following two platforms should be available:

- **Internal platform** – a platform designed for collection of the customs own information at each member-country, and transformation of this information into a common data standard, as well as for spilling to and receipt of information from the external platform, which will be accessible only for local users without change of existing internal information system;
- **External platform** – a single unified platform for all CCC member-countries, designed for information exchange and delivery, which will be accessible for external users (system servers of each party).

A key characteristic of selected servers should be a comprehensive integration of all system components – hardware and software – into a single complete computer system, which would

fully comply with requirements of business application and which would allow for rapid roll out and implementation of application programs.

A server system should ensure the following:

- High level of competitive capacity – it should possess a technologically neutral architecture, which would ensure readiness for an immediate application of newest developments in hardware and software technologies with no need to change existing application programs;
- Server reliability (outage considerations) – server operation availability of 99,9%, i.e. not more than 10 hours of unplanned outage of equipment per year;
- High level of protection for all resources available in the system;
- Support of network interface standards;
- Easy operation;
- Scalability both by hardware expansion (with no server operation stoppage) and by interaction of independently functioning different types of operational systems based on a common platform;
- Opportunity for integration with any existing local information system with no fundamental changes required;
- Reliability and security, which should be ensured by several time back up both on hardware and software levels (starting with mirroring of hard disks and ending with duplication of data transmission buses), journaling and logging, and creation of a backup copy at tape library.

The external platform should be fully 64-bit: both with regards to its database and to all applications operating in the platform.

3.2. Communication Network

When forming the unified information space of the CCC member-countries' Customs Administrations, it will be necessary to create a specialized communication network for ensuring trouble-free transmission of data between servers located in individual countries.

When building a specialized communication network, the following criteria should be taken into account for a selected option:

- **Flexibility. A** full mesh network with dynamical on-demand reallocation of carrying capacity of communication channels and with features for automatic reconfiguration and redundancy should be ensured.
- **Cost Efficiency.** Network operation costs should be minimized.
- **Rapidity of Roll Out.** The whole network should be rolled out within a shortest period of time.

3.2.1. Platform Basic Functions to be Supported by Telecommunication Network

Specialized communication network should support the following basic functions:

- Features for voice transmission;
- Maximum quality of voice transmission;
- Features for on-demand data transmission channel allocation;
- Low level of power consumption;

- Automatic power adjustment;
- Multiple on-demand access;
- Simultaneous full mesh connections;
- Dynamical on-demand allocation of bandwidth at data transmission;
- Efficiency of traffic transmission on communication channel;
- Availability of Network Management System and Network Control Terminal.

To evaluate the communication network performance, the following characteristics should be used:

- Data transmission speed on communication channel;
- Carrying capacity of communication channel;
- Accuracy of information transmission;

3.2.2. Building Telecommunication Network based on Satellite Demand Assigned Multiple Access (DAMA) Channels

As an option for telecommunication network, satellite communication technology with assigned access to satellite frequency resources can be proposed.

Throughout the world, lots of researches and product developments related to IP and its comparative protocols are being carried out, such as IP multicasting, ReSerVation Protocol (RSVP), reliable transport protocols and streaming protocols.

The satellite option allows to bypass the landline infrastructure and to establish direct connections between users and data processing centers through the server. When applying the satellite layer, providing for IP data transmission, the provision of improved services with a decreased time of network respond is ensured.

For implementation of global corporate networks via satellites, Demand Assigned Multiple Access (DAMA) technologies by VSAT are widely used. Wideband VSAT system with demand assigned bandwidth is a bidirectional system for corporate networks, which ensures higher efficiency and higher speeds of data transmission compared to other systems.

Dynamical allocation of carrying capacity together with Quality of Service (QoS) functions and TCP acceleration make such a system more efficient and faster compared to other VSAT systems. Such combination of functions automatically increases speed of backward channel, ensuring a required carrying capacity. When high speed of data transmission is available, the backward channel has capacity for speedy transmission even of large multimedia files.

VSAT station based Data Transmission Network (DTN) has a number of features, which can ensure efficient operation of DTN's operational monitoring and control system:

- Direct, – by single satellite jump, – connection between network nodes;
- High channel efficiency (>90%);
- Regulated channel transmission speeds, allowing for the following:

    - To meet more precisely carrying capacity demanded by network node;
    - To provide communication channel to several nodes simultaneously;
    - To adapt to changing load environment.

Such a system decreases significantly costs and ensures substantially better characteristics of the system and better user services. By integration of the routing function with IP schemes with demand assignment bandwidth, the equipment costs can be decreased. Unlike fixed communication channels of landline networks, IP connections spring up and vanish based on requirements, at the same time there no restrictions related to availability of fixed speeds in data transmission between the network nodes. Individual channel bandwidth best fits a current network load, and total carrying capacity of the satellite is allocated dynamically between all nodes.

The network management can be performed by one of the CCC member-countries, where such member-country's satellite station will be equipped with the Network Management System.

Alternatively, installation of an additional network station is possible, where such station will be equipped with the Network Management System and given to a satellite network operator (Satellite Control Center) for servicing.

Option No 1

Here, TDMA/DAMA network architecture is used (demand assigned channel network). The principal advantage of a network with such architecture is high efficiency of using satellite resources:

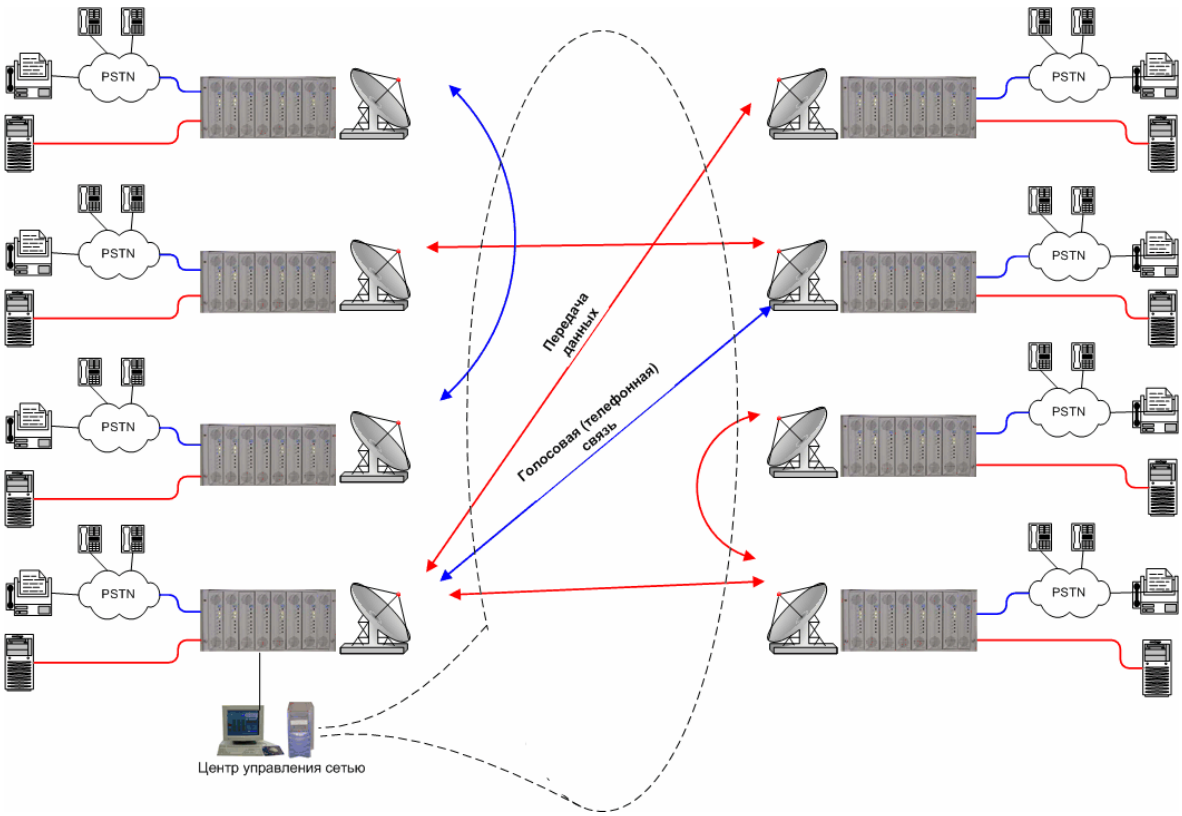
- When there is no data for transmission, a frequency band on the satellite will not be allocated for a given network node, and free resources will be used for data transmission between other nodes of the network;
- In case of having data for transmission, a given network node will be allocated with a part of the satellite bandwidth and direct connection will be organized between the two nodes of the network, - information transmitting and information receiving nodes;
- When volume of data for transmission from one network node exceeds some threshold and at the same time there is an idle part of the satellite bandwidth, then the bandwidth for this node will be increased to speed up the data transmission.

Besides, such a network allows for arranging telephone communication between the network nodes using built-in features of satellite communication station. Each of the stations can be equipped with ports of analog or digital telephone communication. Analog telephone ports can be connected directly to telephone units or to PXB. Calling a subscriber in the network can be done by dialing two- or three-digit telephone number from a calling telephone unit. Communication will be established for less than 3 seconds, while ensuring high quality of voice transmission. Fax machines and modems also can be connected to telephone ports.

To arrange such type of network, a Network Management Center is needed. The Center will determine parameters of allocated channels and will support organization of telephone communication. Should be noted, that the Network Management Center only establishes connections, whilst all data and voice transmission channels go directly between two nodes of the network, bypassing the Network Management Center.

The most optimal, both in terms of costs and in terms of operation, would be to establish the Network Management Center based on a satellite station of one of the parties. In this case, this party's satellite station will be built considering double redundancy requirements to increase reliability of the whole network.

Network Scheme
Network Management System Located with One of the Parties

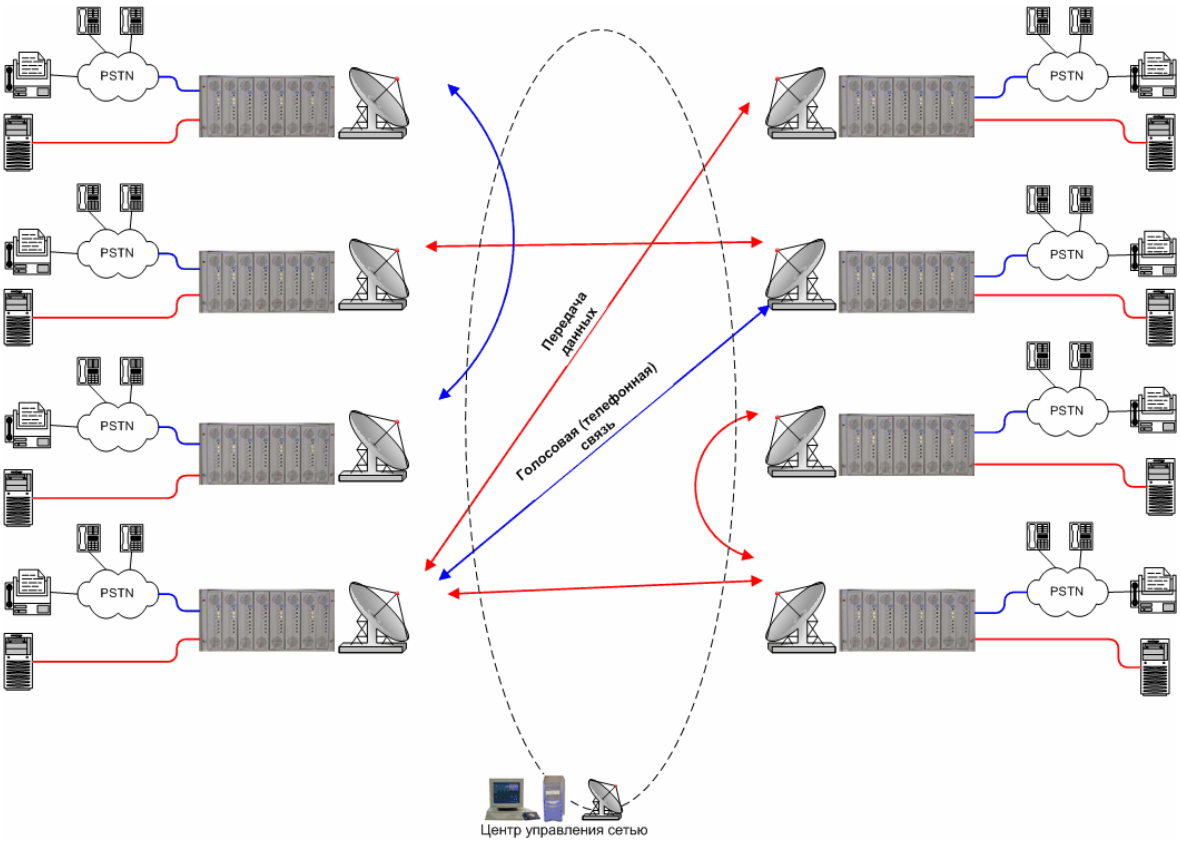


Option No 2

Network architecture in this case is identical with the previous Option, with the only exception that the Network Management Center is located at and assigned to a party, which is not included in the unified information space of the CCC member-countries. For instance, a country – satellite communication operator.

This allows for excluding dependence of data transmission network on effects caused by any of the CCC member-countries, however, operation costs increase under this Option.

Network Scheme
Network Management System Located with Satellite Communication Operator



Option No 3

Repeats the previous Options, but provides for the opportunity to use existing Network Management Center of the Satellite Communication Operator. Thus, the Satellite Communication Operator leases not a satellite frequency resource, but a data transmission server.

Major weakness of this Option is that equipment should be procured based on the Satellite Communication Operator's recommendations and that traffic cost will be defined by the Satellite Communication Operator independently considering the traffic profitability. Also should be noted, that not all operators provide telephone communication service within one network segment.

Option No 4

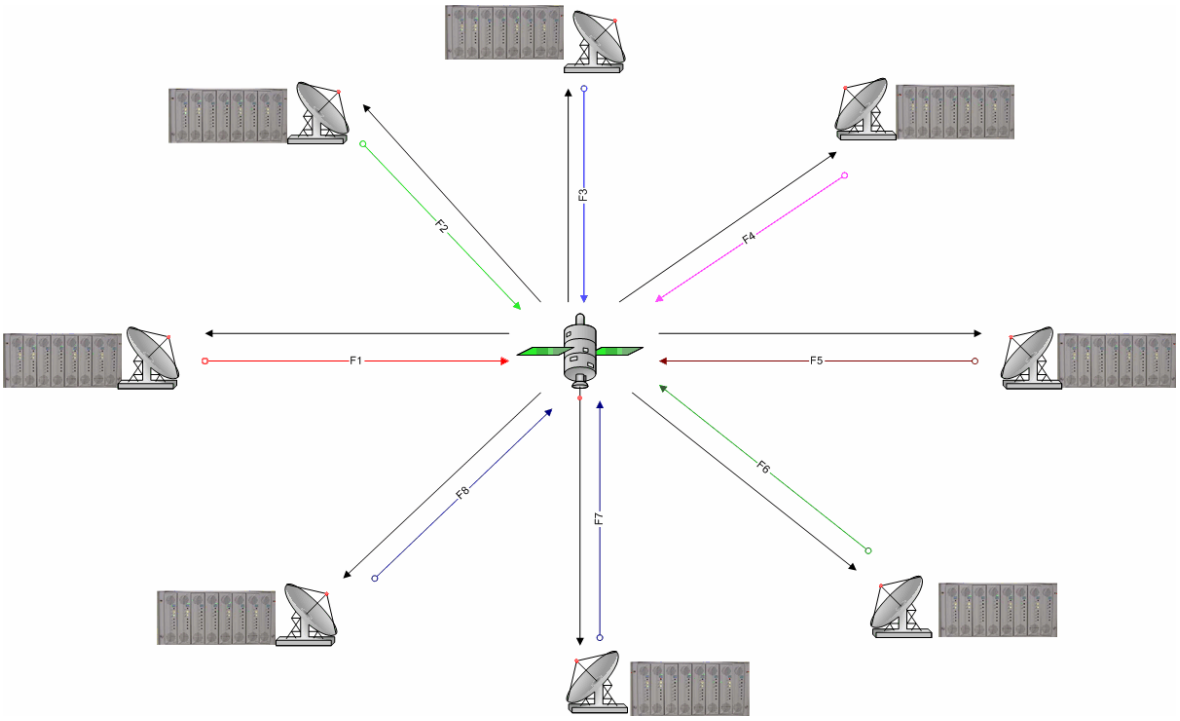
The multi-star network topology is used here. Each station is equipped with seven receiving and one transmitting modules. Each station gets a fixed bandwidth for data transmission. Any data burst, transmitted from one station to another, will be received by receivers of all stations. For filtering outsiders' data, each station will be equipped with IP routers.

Telephone communication can be arranged only when using additional IP telephony communication gateways.

The strength of this Option is equality of all member-countries when using the data transmission network. Here, each participant of the data transmission network fully controls transmission of own information flows.

The weakness of the Option is inefficient employment of the satellite resource, since the satellite bandwidth will be assigned to one of the stations regardless of whether the bandwidth is used or not used by such station.

Multi-Star Network Topology Scheme



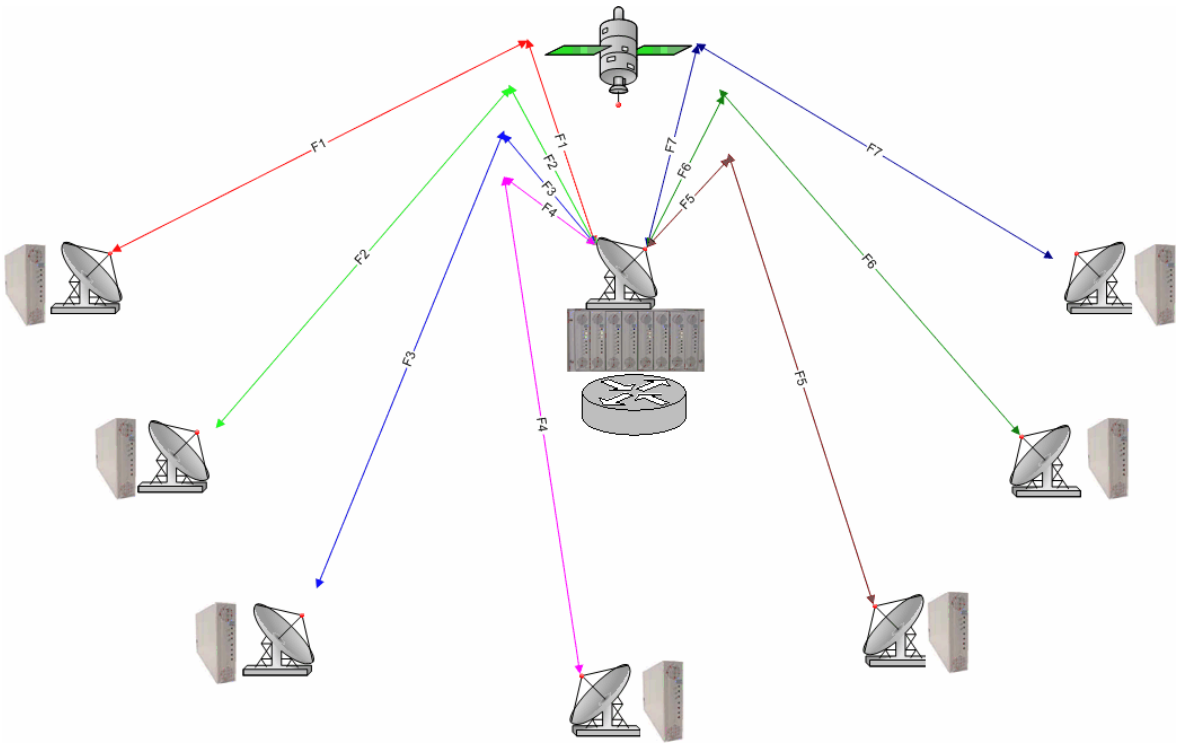
Option No 5

Under this Option a star-type network topology is used. One of satellite stations assumes the Hub functions. All data between two nodes within the network are transmitted and routed through the Hub only.

Currently, this network scheme is the most frequently used scheme by communication operators.

However, such technology eliminates the opportunity to organize telephone communication, since all communication channels will be arranged by two satellite jumps. This brings unacceptable delays when implementing voice and video communication.

Star-Type Network Topology Scheme



3.3. Data Sharing Schemes between Information Resources of the CCC Member-Countries

3.3.1. On-Request Data Sharing

Each member-country's server will be equipped with the following:

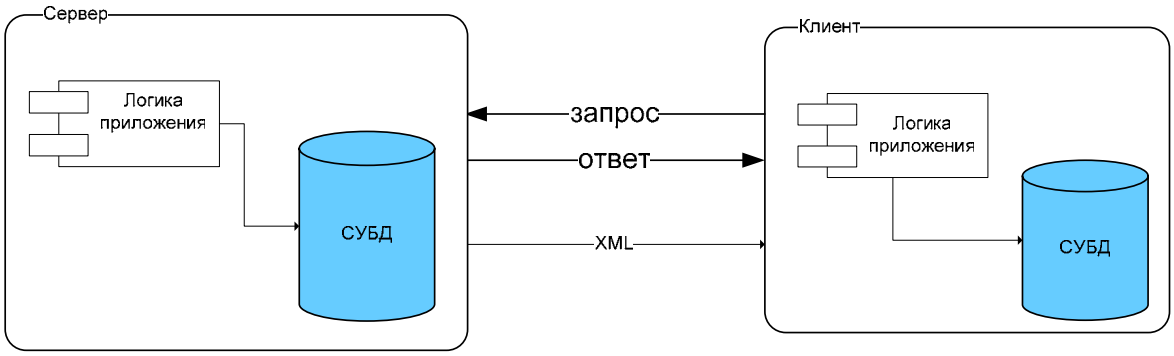
- Application server for executing application logic;
- Database server used as data warehouse.

Applications will control client authentication (when a server connects to another server), ensure security policy (user rights, roles, change of passwords after certain period of time), etc.

When connecting to the system, a registered client makes a request for his needed information, and the server checks authority (rights) of this client for receipt of requested information. If the client is authorized to receive the information, the server will transmit the data.

All data are processed in XML format.

XML is a universal format for data transmission, which is absolutely transparent and which does not depend on platform type.



Strength:

- By making flexible requests, the client can receive any volume of his required data from accessible server database.

Weakness:

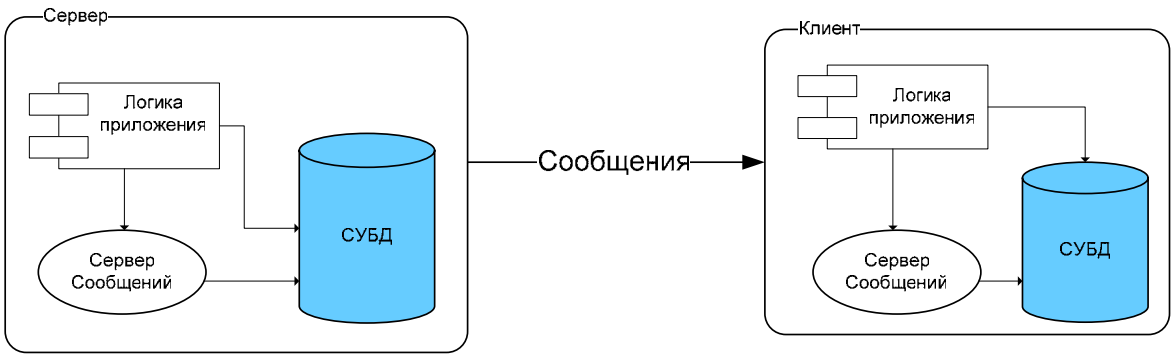
- Each server controls its own security policies, which involves additional costs for developing client access security control programs for server database.

3.3.2. Data Sharing by Subscription

Each member-country's server will be equipped with the following:

- Application server for executing application logic;
- Message server for sending messages;
- Database server used as data warehouse.

As agreed by the parties, a message format will be defined and a format of message data will be defined. Each server will have subscribed clients (other servers), and message sending interval will be set. Upon completion of all required adjustments of the server, each subscriber will receive its portion of data within a defined period of time.



Messages will be subdivided into two parts depending on their contained information:

a) Messages, containing an attached file in form of table data – in this case the client receives an attached file and converted data in own Database Management System (DBMS) using a specially developed application.

Strength:

- Independent platform – each client converts received files based on own DBMS parameters.
- Less security policies compared to on-request data sharing.

Weakness:

- Difficult to change data structure, which entails re-adjustment and development of applications at each single change of structure and format of message exchange.

b) SQL command, containing DBMS log – after each change of the server data, a command processing by the server will be replicated to the subscribers; this way the client will perform the same actions with the server.

Strength:

- Absolute identity of databases – each client receives one and the same command, which the sender sends.
- Database updating is on-line.
- Less security policies compared to on-request data sharing.

Weakness:

- Identity of DBMS servers is required.
- Difficult to change the data structure, which entails re-adjustment and development of applications at each single change of structure and format of message exchange.

4. Stages of Building and Development of the CCC Member-Countries' Unified Information Space

Particularities of legal and regulatory framework of the Customs Services of the CCC member-countries, as well as existing differences in levels of software and hardware operated by the Customs Administrations predefine a long-term and staged implementation of information integration.

Creation of the unified information space implies for the following stages in its implementation:

- Stage I. Implementation of a pre-project survey of an object planned for automation. Development of data fields intended for sharing among the Customs Administration, and unification of structure of such data.
- Stage II. Development of web-oriented application software. Ensuring mechanisms of security and restricted access to information resources of the system. Installation of hardware and software packages, including system hardware and system software. Roll out of data transmission network based on earth (satellite) stations.
- Stage III. Organization of initial information exchange between the Customs Administration, which require a minimum level of harmonization of legal and regulatory frameworks, customs technologies, regulatory reference information for ensuring uniform understanding of activities and the opportunity to compare and analyze the customs performance data. Sharing the methodologies on how to maintain customs external trade statistics and sharing external trade statistical data as such in volumes sufficient to maintain comparative (mirror) statistics related to foreign trade with the CCC member-countries.
- Stage IV. Information exchange between the Customs Administrations, which would ensure their active interaction in the course of performance of customs operations. Development of coordinated schemes of informational interaction with regards to goods delivery controls. Data sharing in volumes sufficient for pre-notification on shipments along with information on traders and their trading operations, control of temporary import-export of goods based on TIR Carnets, smuggling prevention and repression (including information on ways of smuggling, routs of trafficking drugs, psychotropic substances and weapons), targeting traders violating customs legislation etc. Data sharing on movement of goods, which should be under special control due to their restricted circulation.
- Stage V. On-line management of predictable risks and examination of selected goods coming from the CCC member-countries. The characteristic of this Stage is a full-fledged informational interaction in all areas of customs activities. In addition to data sharing, opportunities to conduct video conferences among the CCC member-countries will be ensured.

A staged creation of the UIS implies for interaction both on bilateral and multilateral basis, as well as for potential opportunity for any CCC member-country Customs Administration to join such cooperation at any point of time based on its current capacities and its goodwill.

This Concept of the UIS defines the necessity for further coordinated development of the CCC member-countries' Customs Administrations, considering existing agreements on individual areas of informational interaction and technical cooperation, with the aim to have such cooperation ensuring consistent development of close relations and increased efficiency in customs service of each member-country. This would allow for expanding trade relations, increased quality and decreased time of servicing the trade, increased revenues, improved

efficiency of measures preventing and repressing smuggling of drugs, weapons and cultural valuables.

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