COCOS Customer Engagement Platform - COCOS CEP

Next generation Customer Relationship Management presentation

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Contents

1 Preface

1.1 Purpose of the document

The document presents the COCOS Customer Engagement Platform (CEP), the scope of its functionality and advantages. It touches the basic layout of the system, the possibility of upgrades and trends in the areas covered by the product.

Disclaimer
All figures presented in the document are print screens from different COCOS CEP applications. They are just examples and the concrete realization of the projects can have a different look-and-feel. Application GUIs can change during the application life-time and according to the partner's request. If the changes are of a minor character and do not influence on a general perception of the application itself, the document is not to be changed.

1.2 Used abbreviations and terms

WebRTC (Web Real-Time Communication) is a collection of communications protocols and application programming interfaces that enable real-time communication over peer-to-peer connections. This allows web (compatible) browsers to not only request resources from backend servers, but also real-time information from browsers of other users. This enables applications like video conferencing, file transfer, chat, or desktop sharing without the need of either internal or external plugins.

Abbreviation	Description
ACD	Automatic Call Distribution
CATI	Computer-assisted telephone interviewing
CEM	Customer Experience Management
CEP	Customer Engagement Platform
CIM	Customer Interaction Management
CRM	Customer Relationship Management
IVR	Interactive Voice Response
SMS	Simple Message Service

2 Contact Center

2.1 Introduction

At the time of the intensively increased competition and struggle for success, it is only natural that companies tend to improve relations with customers, their knowledge about the company products, while reducing the relative production costs.

Traditional **call center**, where a friendly consultant took calls or provided voice information on products by execution of outbound phone calls initiated from the list of clients, has carried out pioneering work and is in a slow withdrawal. The methods of communication have been soon enriched by adopting and submitting Fax, SMS and e-mail messaging. As the traditional paper mail, should also be supported, a **contact center** agent has been enabled to communicate through various media. During his work the agent has been accessing large data sets, controlled by more and more complex database systems.

Contacts with clients have been carried out by a variety of distribution systems, from the queues with the relevant scenarios, taking into account the priorities of clients and services, to the systems for the sophisticated distribution of outbound contacts. Within the contact centers new, attractive services, have been discovered - they became **CRM - centers** (customer relationship support centers).

But – is it enough?

2.2 Multimedia communication

The nature of communications has been always dictated by the **ability to communicate**. From flaming bonfires and smoke signals to the previous generation, who suddenly had a communication terminal (mobile phone) always in his pocket, it was (almost) always accessible and who discovered chat via SMS messages, until today, when every user possesses a pocket terminal that enables **multimedia access** to content distributed over the Internet communicate every day new in new increasingly attractive ways.

3 COCOS Customer Engagement Platform

We are living in the era of customer experience, where customer is given a choice. This customer is in the same moment requesting and expecting a seamless experience across all channels and touch points. On the other side the company which is offering customers' services demands a single view of every customer interaction with its business at its fingertips: from the moment, the customer walk into your stores or office, visit company's website, tweet about its products, or reach out the company's call center for help.

The reality is: the company needs to think beyond the traditional CRM, which alone doesn't increase loyalty or advocacy anymore. Today customer relationship management (CRM) is more relevant than ever, but to be successful it needs customer experience management (CEM) as well.

CDE nove tehnologije d.o.o. (CDE) offers a technology that can support the infinite possibilities and unique paths comprising your customers' journey today. Multiple communication channels are driven inside single platform with complete campaign management tools for advanced segmentation and targeted interaction management. **COCOS CEP** is a unified platform that integrates management of all communication channels in one place, support tools for integrated management of campaigns, advanced segmentation and targeted interaction management.

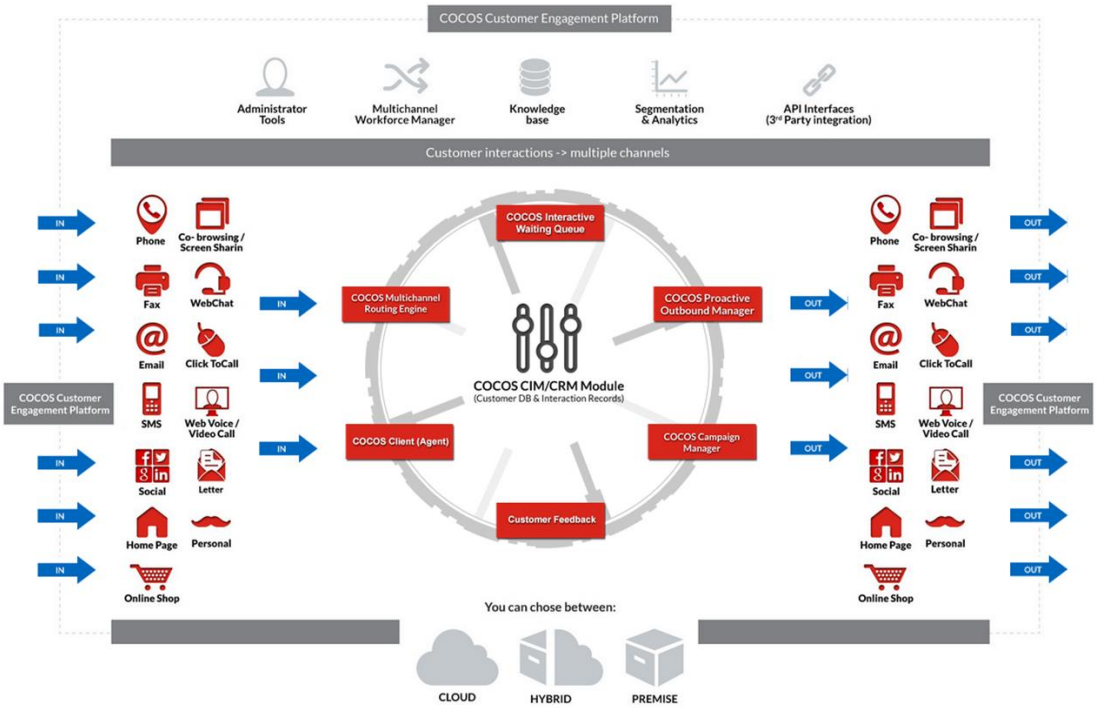

Figure 1: COCOS Engagement Platform

Its open modular architecture allows transition of the traditional contact center to a Customer Engagement Center and provides continuous upgrading with the emerging technologies.

3.1 Communication devices

Not long ago the customers have been keeping their communication via their **desktop phones**, **mobile phones**, **Fax devices** for handling their calls and SMS messages and **personal computers** for sending their e-mails. Today's typical customer uses a completely different terminal equipment, which greatly expands communication skills - **PC**, **tablet computer**, **smartphone**, **embedded devices** and more recently, **wearable devices**. Non-personal communication is expected from a large set of devices (**Internet of things**).

WebRTC technology enables both parties (e.g. customers and agents) to use **virtual "terminal devices"** - software available on the website. In this way, the traditional Contact Center Agent's »working place« is realized as a web page in WebRTC technology and the customers can perform direct communication with the contact center by clicking a **Click-to-Call** buttons integrated within a company's web page or even by scanning a **QR code** on a company's product paper material.

3.2 Omnichannel communication

While customer in a contact center traditional is limited to traditional voice channels, fax, SMS, MMS and e-mail messages, COCOS CEP offers open options of **Omnichannel communications**. The user - either the customer, or the consultant (contact center agent) is enabled to communicate over a plurality of channels.

The transition from traditional telecommunications to IP networks has enriched communication capabilities of the telecommunications services users. COCOS CEP offers solutions that keeps pace with technological development and ongoing upgrades to its products with the latest communication solutions.

Figure 2: Communication channels COCOS CEP

During handling his call over the chosen communication channels, the user (customer or agent) is in position to adds yet another type (e.g. during communication via voice call, he can add a web chat communication or call over video channel; during communication via web chat the user can or upgrade the chat to voice / video call; the user can switch from one channel to another.)

While handling any type of call, the user is enabled to carry on file transfer to the party in the call or share his screen.

Usage of a particular channel can be supplemented with additional features provided by the channel. As an example, the voice / video call enables invoking of services like biometric identification (voice / facial / ID card / / snapshot image / fingerprint recognition), while long-term presence on the web portal customers can initiate a proactive contact with this customer.

3.3 WebRTC functionalities

Upgrading of a traditional contact center with WebRTC technology allows introduction of new processes and services which are carried out according to new communication channels and enable customers to communicate directly from his web browser.

User (customer, agent or administrator) does not require any desktop applications, all he needs is a web browser and secure access via the Internet to the COCOS CEP system. Agents can access the system from any remote location (e.g. from their own home or from the location of the visited customers).

Click-to-Call allows establishing of a contact with COCOS CEP, directly from the company's website. By simple clicking of a button or inserted link, appropriate contact center services are established.

Unlike traditional technologies, where the Click-to-Call functionality allows the user to request a callback of the agent, the WebRTC technology enables establishing of a direct call through the Internet.

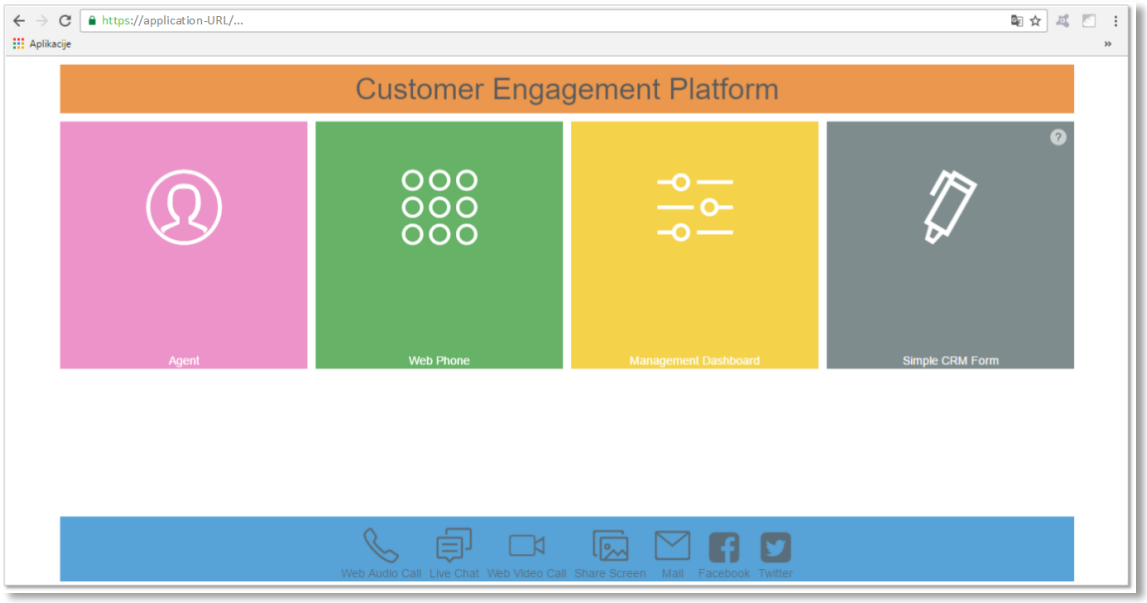

Figure 3: Example of Click-to-Call buttons implementation

Beside **Voice call** the customer or agent can handle also **Video call**.

Web chat enables textual communication between the customer and agent. Chat can be established by any party (customer or agent), or by a suggestion of the system itself (e.g. after a long presence of the customer on the company website).

Web chat can be carried out simultaneously with **Voice** or **Video call**, the user can switch from one type of communication to the other. During his communication, he can invoke **file transfer** or / and **screen sharing**.

Social networks (e.g. Facebook and Tweeter) enable two way textual or Voice / Video communication between customers and agents. Textual messaging can be complemented with multimedia content.

Proximity services enables the system to automatically detect proximity of a (potential) customer and invocation of related marketing services.

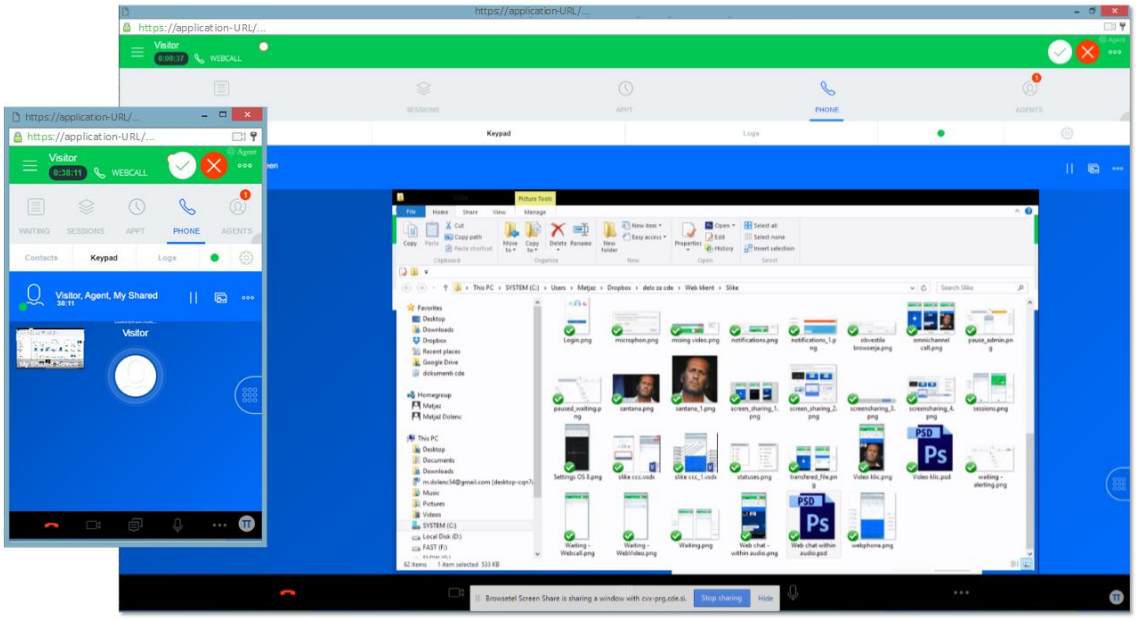

Figure 4: Example of voice call handling in Web Phone (left) and related Screen sharing (right)

3.4 CEP CIM / CRM Module

CEP CIM / CRM module is the core of the COCOS CEP system. Its function is to store customer data and history of their interactions. Together with the intelligent multichannel routing, contacts distribution based on agent's skills, real-time reporting and interactions recording across all channels (voice / video, email, fax, SMS, web chat, social networks, documents, etc.) It gives the company's agent 360-degree view on the customer and allows him to highly personalized and unified approach in providing of customer's support.

CEP Customer Interaction Management (CIM) enables:

- Handle and mix incoming / outgoing multichannel interactions through the customer favorite communication channel: voice / video, email, fax, SMS, web chat, social networks, documents, etc.,
- Support Interactive Waiting Queues, which offer a true multimedia experience to customer and a unified list of waiting contacts to agents,
- Manage complex intelligent routing of contacts based on agent skills, customer segmentation, etc.,
- Create and manage proactive outbound services,
- Real-time monitoring of agents' efficiency, with the aim of optimizing the workforce, regardless of location or working method (work at corporate headquarters, remote working, mobile working, etc.),
- Using of unified communications,
- Call recording, etc.,
- Supporting of multilingual environments (basically supported Slovenian, English and Russian language),
- Transition from ISDN to VoIP and WebRTC technologies that allow different implementation options (premise, cloud, hybrid),
- Flexible scalability in dependence of business needs, based on COCOS CEP modular architecture, where modules can be added and linked to the unified system via SIP and SOAP-based protocols.

3.5 CEP Multichannel Routing Engine

Call (contacts) via different communication channel are received by the system and further on delivered to the CEP Agent, by the **CEP Multichannel Routing Engine** functionality. Contacts delivering procedures include **Inbound** and **Outbound contact routing** as well as **mixed (blended) contacts routing**.

In COCOS Omnichannel Contact Center the traditional **ACD** (Automatic Call Distribution) is supplemented by **ADD** (Automatic Document Distribution), **AMD** (Automatic Mail Distribution), **AFD** (Automatic Fax Distribution), **ASMSD** (Automatic SMS Distribution), **AWCD** (Automatic Web-chat Distribution) etc. Each new communication channel also brings new rules for distribution of the contacts.

Calls (contacts) addressed to specific contact center campaign are directed to specific (campaign related) groups of agents. Within the group the call is delivered to the agent with the appropriate attributes (qualifications (skills), agent's activity within the group, assigned channels...) and / or attributes of the campaign itself (content, priority...). Routing can depend on a different level of service according to customer segmentation, obtained from internal customer data (e.g. data from back-office systems, customer contact dat...) or external systems. Routing can also be in a relation to the identified customer experience (Customer Journey, Customer Experiences), Web portals and Sub Web portals from which the client establishes contact...

3.6 CEP Proactive Outbound Manager

Outbound calls (contacts) are being distributed to the customers and agents by different algorithms, from the ordinary direct call dialing, to sophisticated **Predictive dialing** algorithms, which enable optimal utilization of the agent's working time.

COCOS Proactive Outbound Manager enables connecting with customers, customers informing by anticipating their needs, reaching out with useful and timely communications and triggering execution of the right transactions and outcomes at the right time. All this is achieved by using:

- Advanced Outbound call campaigns,
- Predictive dialing,
- Proactive notifications,
- Push notifications to mobile,
- Virtual agent services,
- Blended Inbound / Outbound campaigns;

COCOS omnichannel outbound solutions enables the system integrator to perform scheduled or ad-hoc campaigns to his customers via Voice / Video, e-mail, Text, Fax, Web chat, etc.

3.7 CEP Interactive Waiting Queue

If the functionality of inbound call reception and delivery within a traditional contact center is based on **Call Waiting Queue(s)** system and traditional **IVR services**, enabling interactive communication with customers through a dialogue with automated voice menus and user's DTMF dialing, today, in COCOS CEP the inbound call is supported by **Interactive Omnichannel Waiting Queue(s)** procedures and **Visual IVR**. This combination enables the realization of automated dialogue with the customer on the level of services offered by the internet technology (e.g. integration with the portal company).

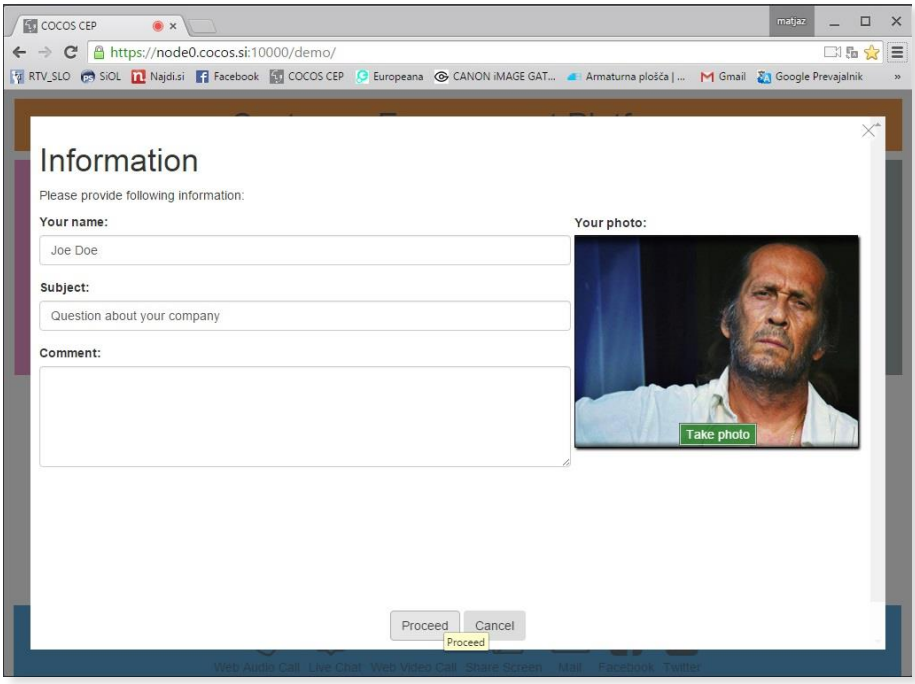

Figure 5: Example of Visual IVR questioner used before transferring a call to the agent

Examples of standard and optional functionalities offered by Visual IVR are:

- Each channel offers a specific (channel attribute related) call waiting queue,
- Instead of voice notification messages, the customer can be, at reception of his call, notified by video presentation of the company, video advertisements or different multimedia information. Voice or video notifications are adopted to the needs of campaign, customers' segment, etc. and can be customized.
- Automated conducting of chat is enabled by chatbot procedures. If the system recognizes question and prepared answer in its data base, it offers the answer to the customer. If the answer is not recognized, or the customer is not satisfied with it, the call is distributed to an agent.
- While waiting to a free agent, the customer is receiving the system notifications (working time or unavailability notifications (with possibility to leave a message), agent busy notifications, customer status in the waiting queue, call delivery to working place or agent notification…),
- While waiting to the agent's call accepting the customer can:
    - Browse the company Web pages,

  - Interactively, by answering the given questioner, present his personal data,
  - Interactively, by answering the given questioner, present his wishes and expectations, before being connected to the agent,
  - Interactively chose the contact type (channel) e.g. Voice / Video, Web chat…;
- Customer can, on his request, by clicking Click-to-Call button, establish a call with an agent and share his screen with him. In this way, he can obtain advices with his web shop activities, installations or usage of particular applications from his device, etc.,
- If the customer is present on a company Web page for a predefined time period, he is automatically offered a possibility to contact the agent,
- Agent can get information about customer activities, e.g. his presence on a particular company Web page,
- At the end of communication with the agent, the customer can get a Customer Satisfaction questioner and evaluate his contact handling quality;

When accepting the call, the agent is given all customer **presentation data** delivered by the public communications network via its signaling, previously entered the customer by Visual IVR procedures, or determined from the customer's history data. The customer can access the system as an **anonymous** or a COCOS CEP **registered** party, and may be presented by traditional data (e.g. Telephone number), or presentation data offered by modern services and records in databases (Name, Title, Avatar, Location...).

CEP Interactive Waiting Queue scripts can, if defined so (e.g. in case of unavailability of the system or too long waiting on a free agent), offer customer invocation of a **Callback request**. Such a request can be realized by IVR menu or by clicking the Click-to-Call button. While doing this, the customer can also complete the questionnaire for the preparation of data for the future contact.

3.8 CEP Web Agent

CEP Contact Center agent's working place comprises of the **CEP Web Agent** application and **Pop-up CIM / CRM forms**, depending on the services that the agent is performing. The application is running as a **Web Agent Dashboard** and is accessible via all WebRTC compatible browsers. Information on this is given in a separate document.

CEP Web Agent is a basic agent's application which enables agent's Login / Logout, reception and processing of all contact types, control of the waiting queue, tasks and appointments, basic analytics of agent's work, transferring contacts and related data to another agent and communication with the contact center personnel.

CEP Web Agent application **integrated Web Phone** enables simultaneous handling of **one voice / video call** session and **multiple simultaneous Web chat sessions**. Number of simultaneous sessions is determined by the agents himself (by CEP Web Agent procedure). Web Phone enables performing of different service such as file transfer and screen sharing. When already handling voice / video call, the agent is unreachable for other voice / video calls.

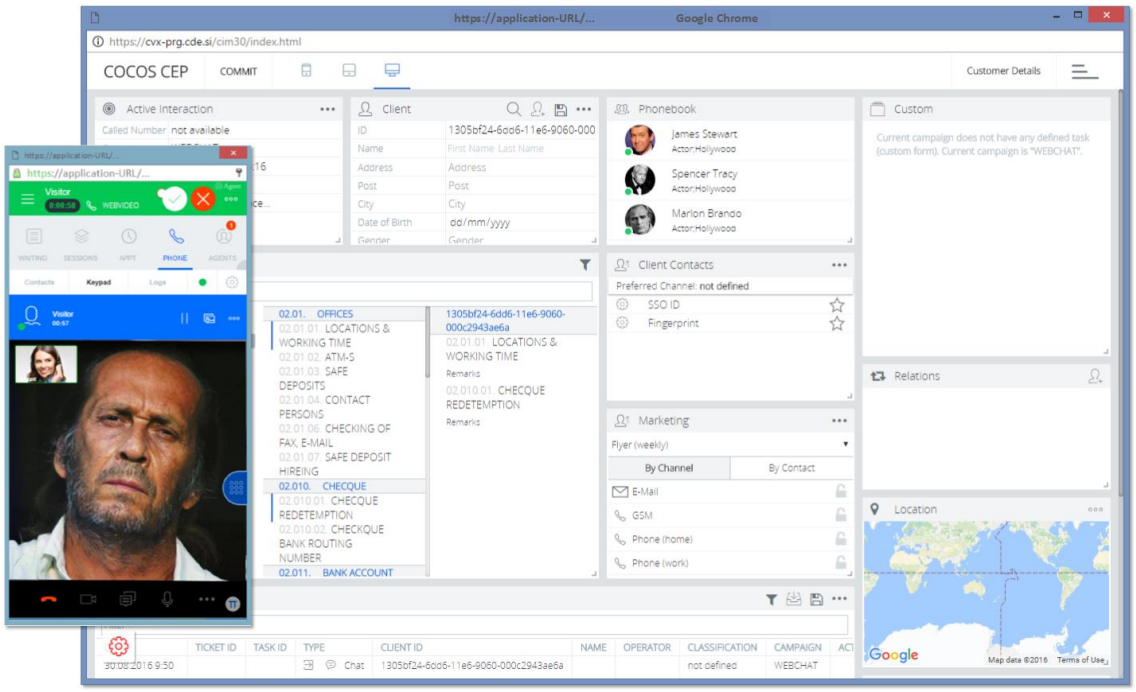

Figure 6: Example of CEP agent's dashboard

Standard and optional functionalities enabled by CEP Agent are:

- Agent's Login / Logout and management of the different agent's statuses (e.g. PAUSE, ADMIN work, WAITING FOR CALL, CONVERSATION, WRAP-UP). Company specific agent statuses can be assigned (customized). Agent can login himself to a particular group-s (task-s) from the list of agents' groups, in which he is assigned by the administrator.
- Accepting, handling and transferring of the call (contact) together with the related data, call hold. During the time, when the call is held, the customer can receive different (customized) notifications.
- Suggestive automated supplementing of text on basis of few selected characters,
- Establishing of contacts with other agents, administrative and supervisor personal via Voice and Web chat channel,
- Entering and overview of the call (contact) related data,
- Overview over the call (contact) history and agent-specific reporting,
- Playback of agent's own calls (contacts) recordings – active and archived,
- Call (contact) related data transfer to 3rd Party systems (Back-up systems, existing system integrator's systems),
- On-line overview over the agents' and groups' statuses,
- Categorization of the call (contact) at end of the contact with the customer. Agent can use predefined and / or customized categories.
- Working in more agents' groups and assigned campaigns. Agent can select the campaigns in which he will be active.
- Assigning of tasks to second-level agents, together with related data, without the customer awareness,
- …

CIM Web forms provide an insight into the history of the contact / customer, access to the data for the implementation of services, assistance with implementation, the use of classifiers, etc. When working with the CIM Web forms, the agent is enabled to use auto-suggestive methods (e.g. checkbox standard answers, classifiers, standard samples (templates), responses ...).

Data collected and entered to CIM Web form during the agent and customer communication may be recorded to internal and external systems, e.g. to system knowledge base, like **CEP Knowledge base**.

3.9 CEP Campaign Management System

CEP Campaign Management tool enables automated planning, organizing, managing, budgeting, monitoring of different marketing campaigns, using different communication channels (voice calls, email, SMS, MMS, IVR, fax, social networks post, etc.), including monitoring responses, costs, campaign efficiency. Basic CEP Campaign Management functionalities are:

- Preparation of Campaign content and budgeting;
- Planning of advertising activities and definition of target groups;
- Planning end running of marketing campaigns;
- Running and monitoring of marketing campaigns and related advertising activities;
- Export of results of marketing campaigns to external information systems or CRM/CIM database;
- Integration of complex Screen form questionnaires prepared by Screen Form Editor or Questioner Editor with support of branching algorithms between questions with Call Center Outbound Campaigns and CIM (Customer Interaction Management);
- Statistics and Reporting on marketing campaigns;

3.10 CEP Managing tools

COCOS CEP attributes management, traffic distribution, real-time control over the activities of the system, presentation of the system diagnostic, statistics and reporting in order to increase the quality of services and predictions of future behavior, etc., are necessary functionality for the successful operation of the entire COCOS CEP system.

CEP administrative tools are intended just for these functionalities. Web Administrator application provides:

- Overview over all COCOS CEP modules operations,
- On-line overview over CEP Contact Center activities:
    - Individual agent status and productivity,
    - All active communication channel service level,
    - Call waiting queues, traffic excesses status, appointments status, etc.,
- Statistics measurements reporting and historical reporting preparation, regardless the communication channel, etc.,

- Simple administration of the Contact Center attributes (system, administrators, agents, agents' groups, lines and campaigns):
  - Real time access to information, allowing administrator to change priorities, agents' skills, workload, etc.., as soon as it is needed,
  - Traffic distribution between COCOS CEP contact center modules,
  - Creation of services provided by their attributes (e.g. time activity services, ...) or services in progress based on customer segmentation and monitoring of previous results;
- Analysis of the agents work in order to verify their performances and optimal planning of works, etc.,
- Communication with other contact center stuff in a form of voice call or Web chat;

3.10.1 Measurements & Reporting

Extraordinary competition on the market of customer services is forcing the system integrators to perform continual monitoring of their system functioning. Learning from our mistakes long ago is no longer the only method of improvement in the functioning of the customers' relationship. Tracking the system now provides detailed analytics and forecasting trends in service delivery, what is becoming an essential component of success.

COCOS CEP system allows implementation of real-time and historical statistical measurements and their reporting in different ways, to different users which are using different devices. The reports are intended for the overview of the system and its stuff functioning. They offer overview over the services performances and possibility of analytics activities, which should lead to improving of the entire system QoS, planning of the required number of staff...

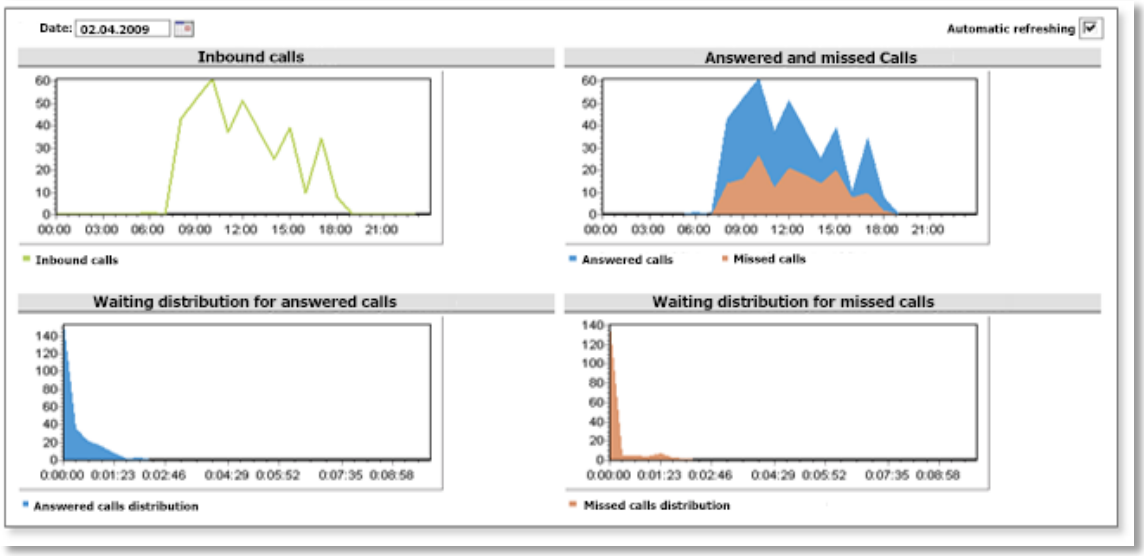

Figure 7: Examples of HTML reports

The reports are compiled on the basis of KPI and other indicators measurements, which are being continuously recorded. The system offers implementation of predefined, standard reports, the ability to customize reports to

user's needs and making new SQL and HTML reports. The reports are presented in **textual (tabular)** or **graphical form**. On-line measurements are being displayed in defined time periods.

Measurements and their reporting are intended for different company and COCOS CEP personal. **Reporting can be dedicated** to e.g.:

- COCOS CEP agents,
- COCOS CEP administrators,
- Personal with special rights (e.g. company management…);

Measurement results can be reported in different way and on different devices. They can be:

- Presented via Web browser in the **CEP Web Agent** dashboard as HTML reports,
- Presented via Web browser in the **CEP Administrator**,
- Presented on contact center **Wallboards**, having adjustable display options, where everyone of a number of displays can show its own independent report. Beside reporting, the Wallboard can be also used for the stuff (agent's) textual notifications.
- **Printed out**,
- **Exported in standard file formats** compatible with the "Office" applications – usually used for the company management personal;

By the system integrator request, **scheduled measurements** can be arranged with **automatic sending** of reportings to defined location.

COCOS CEP measurement and reporting is managed through the scripting system, plurality of standard reports available can therefore be easily extended (customized) with tailor-made HTML reports to individual needs of system integrators. Examples of standard reports intended for different users of the system are:

CEP Administrator	CEP Agent	Wallboard
Number of logged-in agents,	Number of calls waiting,	For each group of campaigns: Campaign-group name
Number of available agents waiting for a call,	Number of logged-in agents/according to campaigns,	Service level (SLA %)
Number of agents in conversation,	Status of every logged-in agent,	Number of inbound calls, faxes, e-mails,
Number of agents entering data (in wrap up),	Number of answered calls, faxes, e-mails,	Number of calls on queue

CEP Administrator	CEP Agent	Wallboard
Number of agents on a break,	Name of the campaign which the agent is logged into, etc.	Customer waiting time
Status of every logged-in agent,		Number of agents working in this campaign
Length of time of the agent's status,		Number of agents waiting for next call
Number of all calls, faxes, e-mails per agent/total,		Number of callbacks requested
Number of answered calls, faxes, e-mails per agent/total,		Callback waiting time
Number of redirected calls, faxes, e-mails per agent/total,		
Number of all inbound/outbound calls, faxes, e-mails,		
Average talking time of every agent/total,		
Average processing time of faxes, e-mails etc. for every agent/total,		
Number of omnichannel calls, waiting (in the queue),		
Number of agents assigned to a specific task/service,		
Average waiting/queue time, etc.		

CEP Administrator dashboard enables his user usage of **Statistics & Reporting Wizards**.

In a few simple steps, they offer preparation of reports for selected periods of time, based on selection and compilation of predefined offered attributes. Examples of such prepared reports are given below:

Statistics Wizard generated reports
Number of appointments in total,
Number of successful appointments,
Number of unsuccessful appointments,
Number of calls when the customer was busy,
Number of calls when the customer did not answer the phone,
Number of calls when the agent was busy,

Number of abandoned calls,
Number of calls answered in 10 /20 /30 seconds,
Number of calls made by an appointment,
Number of calls resulting in a new appointment (the number of newly scheduled calls),
Number of tariff impulses used – charges for outgoing calls,
Time from the agent's request for a call to his reception or termination of the call if the customer is busy or doesn't answer,
Total conversation time,
Time the agent needed to enter data – wrap up time,
Time between the end of the last call and to the request for the next one,
Average time from the agent's request for a call to his reception or termination of the call if the customer is busy or does not answer,
Total of agents' data/call/wait/pause/busy/total time,
Time from ending the first call until starting a new call;

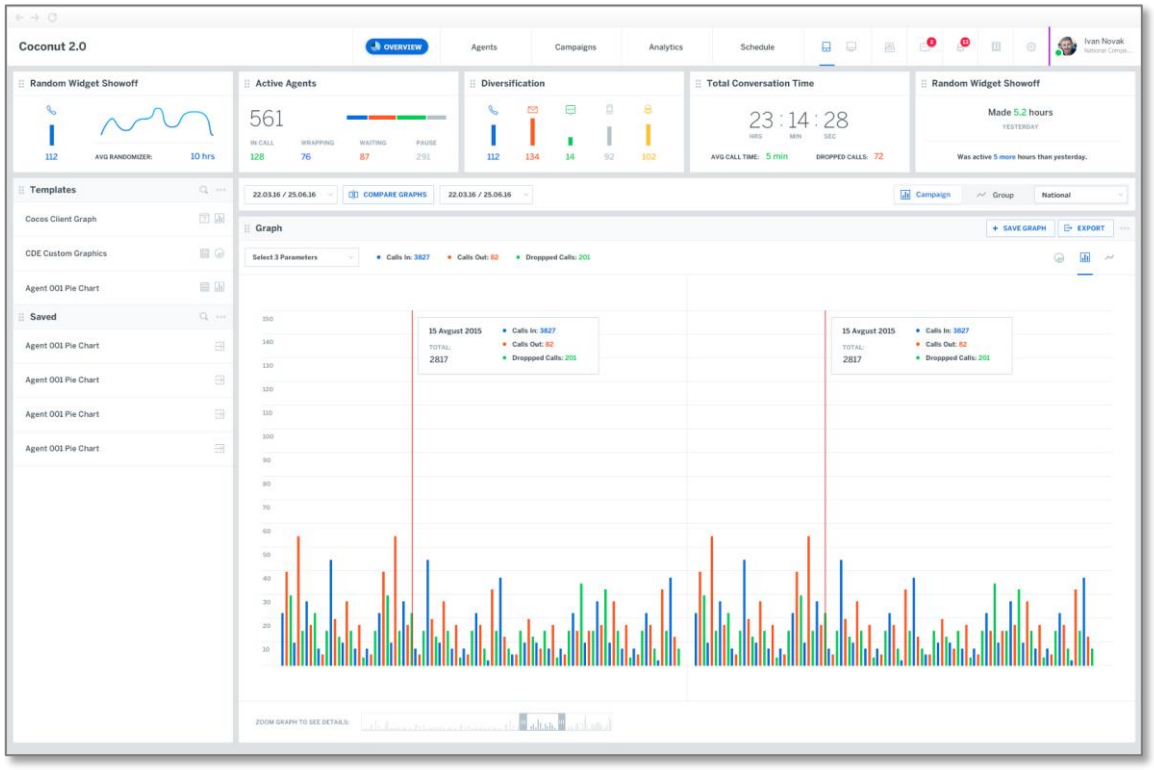

Figure 8: Example of a Historical Wizard generated report for the chosen time period

Continuous monitoring of the system activities, presentation of the diagnostic system results, statistics and reporting in order to increase the quality of services and predictions of future behavior, etc., are necessary functionalities for the successful operation of the communication system.

In addition to measurements of system parameters, important information about the system's QoS is provided by the customer reviews the quality of the contact. The reviews are implemented in a form of agents and system response evaluation at the end of the contact (**Customer Satisfaction Survey** form). COCOS CEP tools are giving further overall possibilities – including the latter-on measure and report the evaluation results:

- On-line supervision over the contact center activities, enabling:
  - Customer evaluation of the given service and agent's contact handling, including integration with the 3rd Party measurement systems,
  - Overview over the individual agent's statuses and productivity,
  - Monitoring of service level (SL) on all communication levels,
  - Supervision of the Call (Contact) Waiting Queues' status, traffic excesses, appointment calls…,
  - Analyses of repeating of calls (contacts) with equal content,
  - Supervision of the system statistics and preparation of historical reporting…;
- Creation of forecasted services or services based on the customer segmentation and monitoring of previous service results,
- Analyses of the agents' work with the purpose of their working success effectiveness…;

Optionally, by the system integrator request, the system enables integration with the NPS metrics.

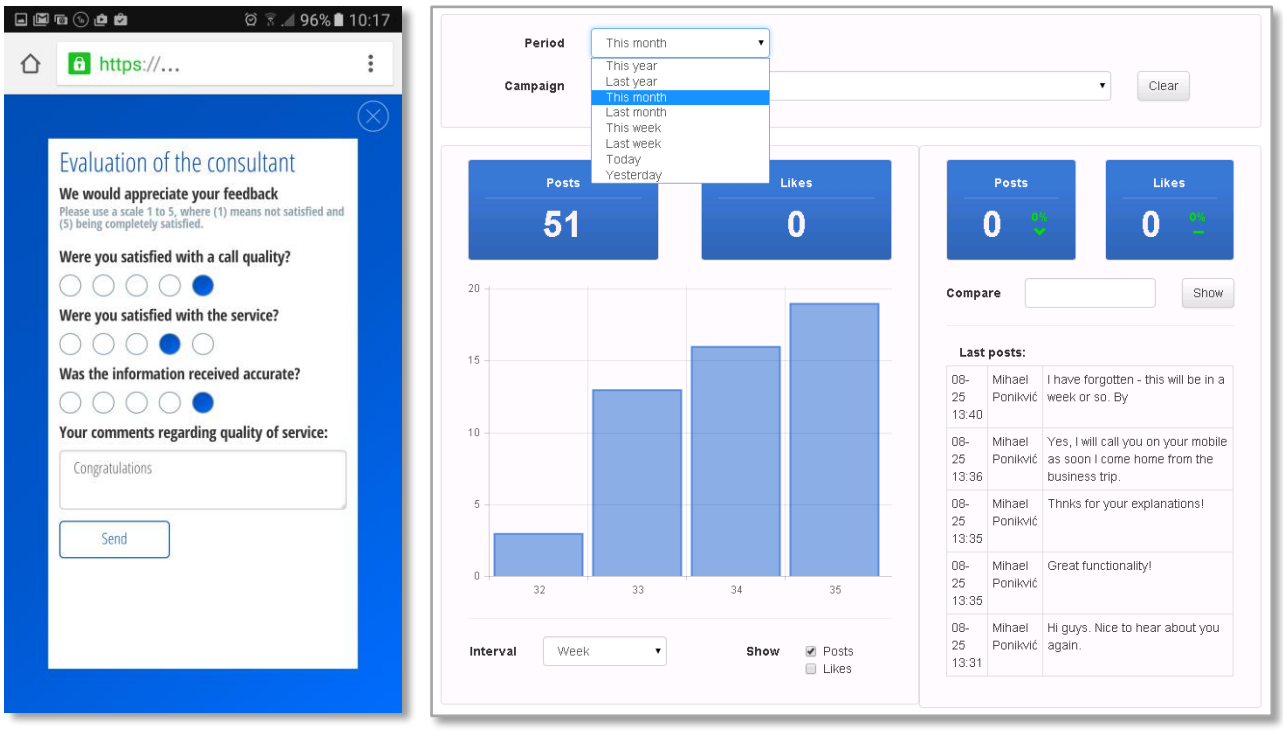

Figure 9: Examples of a Customer Satisfaction Survey form for a smart phone format and Facebook posts' analytics

3.10.2 Call (Contact) recording, monitoring and Audit trail

Due to the purposes of service quality increasing, safety and training system, the COCOS CEP is enabling **Call (contact) recording**.

Recording is provided over **all communication channels**. Voice / video calls' recordings are stored in as voice files in raw or encrypted form, or in original format – voice file for voice channel and video file for video channel communication. Textual messaging recordings are stored in format suitable for reproduction in source form.

Recording system enables recording savings in different formats, e.g. MPEG-2 Audio Layer III - ISO/IEC 13818-3 (MP3), MPEG-2 Audio AAC - ISO/IEC 13818-7, MPEG-4 Audio AAC - ISO/IEC 14496-3, MPEG-4 AVC - ISO/IEC 14496, ANSI/SMPTE 268M (DPX), Motion JPEG2000 or FLAC.

Call (Contact) recording is consistent with the **Regulation (EU) 2016/679** and **European Personal Data Act Directive 95/46/EC**.

Saving (archiving) of Call (Contact) recordings is realized in different options, dependant on the system integrator needs and requests. Recordings can be:

- Sent to a defined e-mail address,
- Archived to the COCOS CEP Secure Store System (CEP SSS), which enables safe document storage, recording management, browsing (filtering) by attributes (contact, contact participants, contact content (e.g. Web chat content) attributes), reproduction of recordings and system capacity scalability;

System supervisor is enabled to implement the agent's contact **monitoring** by performing voice monitoring over voice / video calls between customer and agent and supervision over their Web chat.

Size of the stored (archived) file can optionally be limited to a predefined size. If the size is exceeded, the stored file is divided to smaller entities.

Beside call (contact) recording, the system enables **Audit trail** recording.

Call (contact) recording reproduction is enabled to the contact center personal according to the ACL list attributes:

- Administrative (supervising) personal via the **CEP Administrator** dashboard,
- Administrative (supervising) personal via the **CEP SSS** dashboard,
- Agents via the **CEP Web Agent** dashboard (own calls (contacts) recordings),
- Management personal, via **CEP SSS** dashboard or external applications;

4 System properties

4.1 Architecture

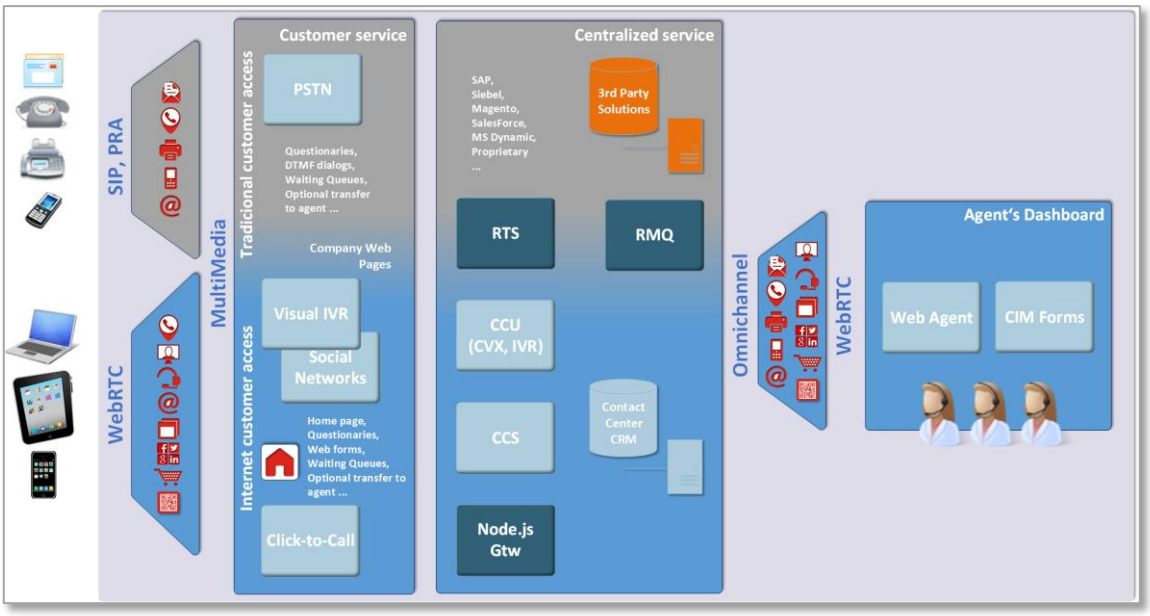

Figure 10: COCOS CEP architecture

CEP Omnichannel Contact Center is built in a three-level architecture:

- **Customer service level** enables integration with telecommunications networks, reception and transmission of customer contacts, the implementation of interactive services, implementation of Social Network services...,
- **Centralized service level** enables central control over the implementation of contact center processes, distribution and commutation of contacts, connecting to internal and external databases and applications, call recording, system analytics...,
- **Agent's Dashboard** level enables establishing of contacts with customers, management of campaigns...;

PSTN module provides access to traditional communication channels such as Voice Call, Fax and Email. It allows implementation of automated IVR services, distribution of contacts to contact center agents.

Visual IVR module enables implementation of interactive user experience during his waiting for an available agent (see chapter 3.5 and 3.7).

Social Networks module enables implementation of Social Network services (Facebook, Tweeter...).

Click-to-Call module enables implementation of all types of WebRTC calls (contacts) directly from the company web pages. The should use a WebRTC compatible web browser, or upgrade incompatible ones WebRTC plugins or extensions.

CCS (Contact Center Server) is the central COCOS CEP module. It concerns for call distribution, waiting queue management, tasks (work flow) processing, analytics, call recording, etc.

CCU (Central Communication Unit) enables establishing and commuting of calls, the implementation of automated voice services and voice notification playback, data replication, etc.

Contact Center internal CRM is a database that enables system configuration and storage of data about calls and events.

Node.js is creating link for manipulation of different social network solutions, such as Facebook, Twitter or LinkedIn. It also enables link to database layer, whether internal or external, provided by third party.

RTS API provides a protocol independent abstraction layer for applications. It provides a consistent, standards-based messaging interface that can be used with basic 1st as well as 3rd party call control (CTI) platforms, or a combination of both (1st party call control with some additional 3rd party call control features).

In the **COCOS Omnichannel Cloud Contact Center Solution** RTS is used in a role of **WebRTC-to-SIP Gateway**, providing the connections with the PSTN customers.

RMQ is RabbitMQ Application Server with implemented Advanced Message Queuing Protocol (AMQP). It enables interconnecting with external 3rd Party applications e.g. SAP, Siebel, Magento, SalesForce, MS Dynamic and other proprietary applications.

Web Agent is the basic agent's tool (see 3.8).

4.1.1 Technologies

COCOS CEP system, which is based on **HTML5** and **WebRTC** (Web Real-Time Communication) technologies, enabling implementation of voice / High Resolution video / web chat communications directly from compatible (Chrome, Firefox, Opera, MS Edge) Web browsers, as well as between them, without the need to install internal or external plugins. Using of other - incompatible browsers for implementation of WebRTC functionalities requests upgrading of this browser with appropriate plugins or extensions.

Since the working with COCOS CEP applications request only WebRTC compatible web browser if also **does not depend** on the user's **hardware platform** (PC, tablet, smartphone), or on the **installed operating system** (e.g. MS Windows, MacOS, Linux, Android).

4.1.2 Agent's working place

CEP Agent / Administrator / Supervisor can perform his work on any device which enables connection to Internet (see 3.1) with installed Web browser. Recommended configuration for the agent's working place is a personal computer with further **minimal** performances:

- Microsoft Windows 7 or later, last Service Pack,
- 2-Core Processor,
- 1 GB RAM,
- 40 GB HDD free,
- Network adapter 1Gb,
- Free USB adapter for plugging of IP VOIP (headset) adapter,
- Display resolution 1280 x 1024,
- Last release of Web browser Chrome, (Opera, Firefox),
- Mouse,
- Keyboard;

While performing their functionalities, the client COCOS CEP applications do not store files locally on the working place storage.

Detailed information about the entire COCOS CEP module requested configuration is described in a dedicated document.

4.2 COCOS CEP implementation options

COCOS CEP Centralized service level can be implemented in different options:

- **Premise** – basic implementation, where the complete COCOS CEP implementation is provided on the location of the system integrator,
- **Hybrid** – where the centralized services are implemented in a cloud, but particular applications (e.g. existing 3rd Party data bases or applications), integrated in the system remain located on the system integrator location,
- **Cloud** – where the entire system is implemented in the cloud. With this, the system provider is fully assuming the responsibility for maintenance of equipment. Such implementation is simplifying upgrading the system functionalities and capacities.

As the system is based on pure IP technologies (e.g. SIP and WebRTC), the access to client applications (agent's dashboard, management and supervision applications…) can be performed:

- **Locally** within a company,
- **Remote** from any arbitrary location within the IP network, enabling activation of **home-workers**, **activation of external agents** within traffic jam situations, activation of **mobile agents** (e.g. insurance agents…), **outsourcing** and **hosting** of services…

4.3 COCOS CEP system topology

COCOS CEP system architecture provides flexible layout, from the smallest capacities (regarding number access channels and agent working places) and a single communication channel (normal voice call) to contact centers with hundreds of agents and the implementation of all possible communication channels.

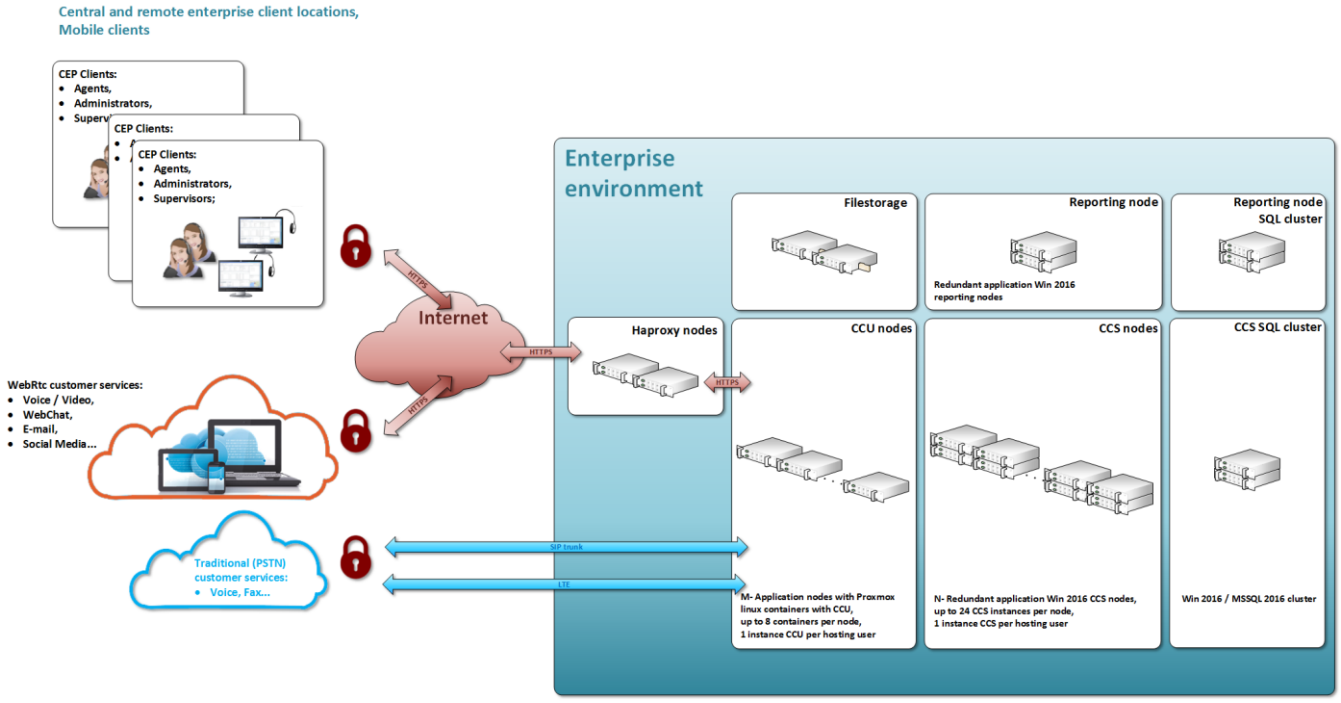

Figure 11: COCOS CEP topology

The picture above presents the basic COCOS CEP Contact Center layout. Presented configuration enables:

- Safe handling of inbound and outbound Voice / Video / Web chat / e-mail / Social Media / ... contacts **via Internet networks** and services,
- Safe handling of inbound and outbound Voice / Fax / SMS / MMS / ... calls through the **PSTN** and **IP telecommunications networks** for SIP signaling,
- **Traffic load balancing** through Haproxy module,
- Scalability of the Contact Center capacity by simply adding of **application node** modules. Each of the application server node can manage implementation of up to 100 agents working places and an adequate number of communication channels. Application server as the basic building block of the COCOS CEP hardware configuration on which central service level modules are implemented.
- In big configurations, the **application node** can be separately implemented as **CCU node** and **CCS node**,

- With the appropriate configuration of application servers, database servers, the system can enable reliable - **redundancy operation**. Redundant components can be installed at geographically separate locations.

Each **application server node** is a standalone unit that provides all the COCOS CEP functionalities. By doubling the application server node their (optional) redundant operation layout is achieved. Increasing of number of application servers also enables increasing of the overall system capacity.

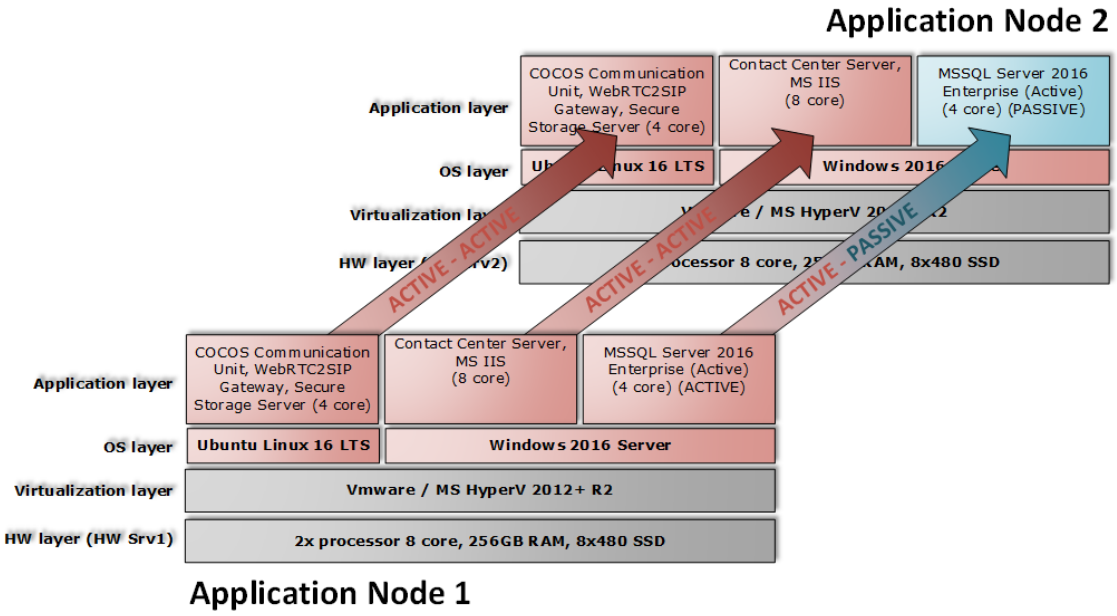

Figure 12: Application nodes redundant configuration

COCOS CEP Servers are designed on the **Microsoft Server 2012** (**and later versions**) and partly on **Ubuntu Linux** platform, with the internal database using **MS SQL Server 2012** (**and later versions**). Server virtualization is performed on **VMware** or by the system integrator request on **MS Hyper-V 2012+ RS**.

Secure access of COCOS CEP Web clients from remote locations enables organization of the agent's work from **central** and **remote** locations (e.g. when company has multiple locations or when the increased traffic load requests temporary increasing of agent's number), enables **renting of contact center resources** (Hosting / Outsourcing services) and organizing **home-working** or introduction of **mobile agents**. One system can support multiple organizations, also enabling independent or central management and separate measurements and reporting. User rights to such systems are hierarchically allocated through the **Access Control List** attributes.

4.4 Adaptability & Customizations

COCOS CEP modularity and scripting based services enable simple customization of the system to different needs of the system integrator. Customization enables:

- Implementation of new services within the existing service framing:
  - Customization according to previous arrangement and specifications. It can be carried out by the COCOS CEP producer or by the trained system provider personal with the aid of:
    - Different COCOS CEP dedicated tools (IVR Editor, CIM Editor…),
    - Standard Web application editing tools;
- Customization of standard COCOS CEP client components according to previous arrangement and specifications.
- Integration (or access to) external 3rt Party data bases or applications which is enabled by implementation of different Gateways and API interfaces (e.g. SOAP, REST, ODBC, …). On a special request the existing APIs' list can be supplement with new API-s.

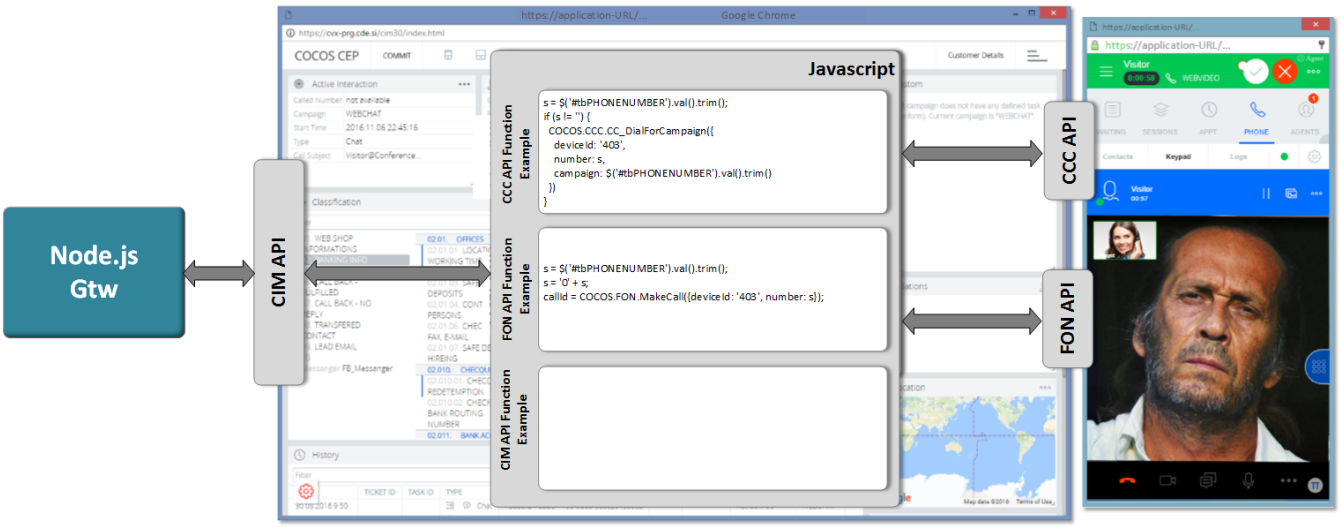

Figure 13: API interfaces of the CEP Web Agent applications

4.5 System scalability

COCOS CEP architecture reflects the philosophy of the CDE company. In the same way as the functionality of the system has been growing with the global introduction of new technologies and communication trends, the user of the system - service provider, can build the system himself.

According to his needs and requests the user can set up a system, which enables establishing of inbound / outbound calls – and latter of, depending on his needs upgrade the system with new functionalities without any problems. The system architecture enables **simple scalability** from the following points of view:

- Communication network access:
  - Basic contact center, based on traditional PSTN telecommunication network protocols can be easily upgraded with access to IP networks. Upgrading to WebRTC services access typically does not request upgrading of HW equipment.
- Enabling of Omnichannel communication:
  - Set of existing communication channels is easily increased by introduction of a new one. While increasing of PSTN channel number ordinary require interventions on HW equipment, new WebRTC services require only software license upgrading.
- Increasing of capacities:
  - Increasing in capacity is carried out depending on the method of installation. In principle it requires upgrading of software licenses, depending on the existing capacity and type of installation it can also require a (modular) hardware upgrade.

4.6 Security and availability

Security of the operation is ensured through the use of secure protocols, encryption option (e.g. Call recordings recordings), using of the Access Control List for definition of user attributes... The user rights attributes can be exported in formats compatible with standard "office" applications. Authentication and authorization of agents is provided by optional integration of integration of Active Directory SSO through Kerberos and / or Active Direction Services Federation.

Optional implementation of Digital Signing Service API interfaces enables usage of digital certificates.

The system environment should provide operation in a closed, secure network. When storing files transferred from external (unsecured) systems the system enables antivirus protection by calling external antivirus systems.

Operational reliability of COCOS CEP equipment is provided by using redundant setting of the central entities of the system and implementation of a reliable power supply (which must be ensured by the system integrator).

5 Supported industries

COCOS CEP flexibility and wide possibilities enable its customization for a wide of industries brands. Many important Slovenian and foreign companies are using it, especially in the following industry areas:

- Telecommunications,
- Finance (Banking & Insurance),
- Commerce,
- Services & Tourism,
- Publishing,
- Energetics,
- Marketing & Research, ...

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