

# Standard Development Considerations of Common Alerting Service for Digital Signage

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**Abstract**— It is very important to provide common alerting information in the digital signage terminal. Common alerting information can be such as severe thunderstorm warning information, earthquake report information, child abduction warning, and so on. In this paper, we described the standard development considerations of common alert functionality to provide common alerting event which is produced from the alert agency to the digital signage terminal through the digital signage server.

**Keywords**— Digital Signage, Common Alerting

## I. INTRODUCTION

Since a digital signage system is located in open area that can be seen by many people to provide rich information, digital signage can play a crucial role in providing alerting service. Digital signage services, which are usually provided as a method of presentation in public areas, are ripe as such a type of services. Large screen of digital signage terminals is commonly set in public places which are useful as an announcement means in alerting situations. It is possible to provide multimedia-based alerting information, because a digital signage terminal device provides multimedia services, in general.

Therefore, we described the standard development considerations of functional architecture to provide common alerting service in digital signage. We also described the detailed functions, information flows and related metadata for common alerting service among related functions.

## II. FUNCTIONS ON COMMON ALERTING SERVICE IN DIGITAL SIGNAGE

Standardization on digital signage is working in the ITU-T SG16/Q14 [1]. Q14/16 takes a role in standardization on digital signage systems and services. Functional architecture for digital signage is described in H.DS-ARCH. Draft Recommendation of H.DS-ARCH is consented on February, 2015 [2]. Requirements on digital signage services under disaster situation are described in H.785.0 [3]. H.785.0 is consented on June, 2014.

Meanwhile, CAP (Common Alerting Protocol) is defined as X.1303bis which is a simple but general format for exchanging all-hazard emergency alerts and public warnings over all kinds of networks [4]. CAP allows a consistent warning message to be disseminated simultaneously over many different warning systems, thus increasing warning effectiveness while simplifying the warning task.

Common alerting service is expected to deliver information from reliable sources to large number of people both swiftly and accurately based on the urgency, severity and affected locations. Digital signage services have the flexibility of selecting contents and controlling contents delivery according to service timing and the location of a digital signage terminal device. Even though there are many standardization works within various areas as the one mentioned above, it is necessary to standardize on common alerting service in the digital signage area.

H.DS-CASF describes the framework for common alerting service in digital signage, which includes requirements, system architecture, detailed functionalities, operations and the related metadata. It is proposed as new work item on November, 2013 [5].

We defined that common alerting related functional components are composed of Alert Agency, Common Alerting Server and Common Alerting Client functions as follows:

- Alert Manager Functions: supports overall management of common alerting on Content Provider/Alert Agency and produces the alert such as CAP defined in X.1303 bis[4];
- Common Alerting Server (CA Server) Functions: supports management regarding common alerting services in digital signage. It manages data relevant to common alerting service, such as alerting area, list of terminal, exit routing information, etc. It is also capable of converting alerting information into other media format for accessibility. It receives alert information from Alert Manager Functions, and delivers it to the CA Client Functions for displaying alert messages.

- Common Alerting Client (CA Client) Functions: supports showing of alerting message received from CA Server Functions.

Figure 1 shows common alerting service framework for digital signage service.

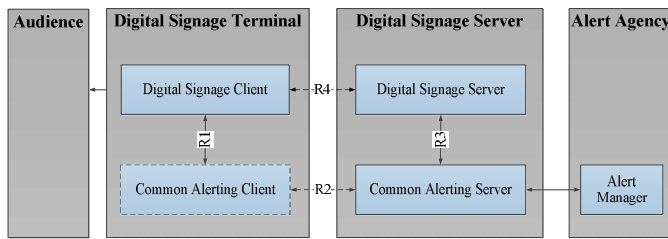


**Figure 1.** Common alerting related functions within functional architecture of digital signage service

### III. FUNCTIONAL ARCHITECTURE OF COMMON ALERTING CLIENT AND SERVER

Common Alerting Client Functions receives the digital signage alerting message from CA Server and displays the alerting information.

Figure 2 shows functional architecture of Common Alerting Client.

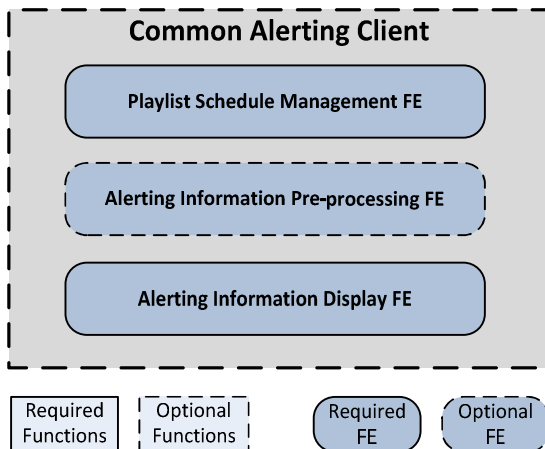


**Figure 2.** Functional architecture of Common Alerting Client

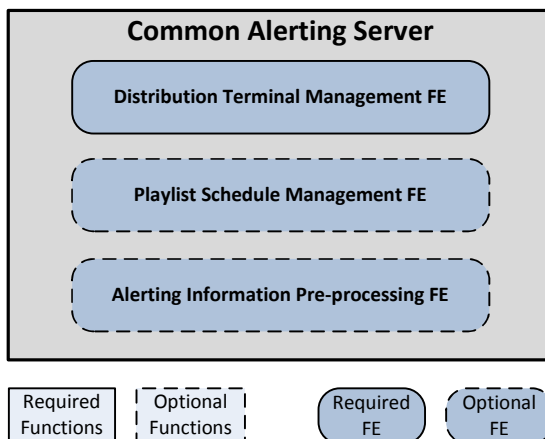


**Figure 3.** Functional architecture of Common Alerting Server

Common Alerting Server Functions receives the alerting message from Alert Agency and controls the overall behavior. Common Alerting Server Functions considers on how the alerting messages are processed in the digital signage. Common Alerting Server Functions delivers the alerting message to the list of digital signage terminals within the distributed area. This list can be retrieved by interacting with the Digital Signage Server Functions.

Figure 3 shows functional architecture of Common Alerting Server.

### IV. INFORMATION FLOWS ON ALERTING SERVICES

Figure 4 shows the playback procedures for common alerting service.

As an assumption, CA Server has already received an alert from an Alert Agency, and the alert contains the affected area information. CA Server creates common alerting message and sends it to the CA Client of pertaining digital signage terminals. When CA Client receives the common alerting message from CA Server, CA Client will display the alerting related information according to the display mode, emergency exit route information and additional alerting information such as TTS and sign language which is derived from common alerting message.

### V. METADATA

This chapter describes the metadata for common alerting services newly defined in H.DS-CASF.

#### A. TERMINAL LIST FOR DISSEMINATING ALERT MESSAGE

CA Server can select appropriate terminals and groups of terminals for displaying alert message to the screen of digital signage terminal. The terminals and groups of terminals are determined according to the event type, urgency, severity, and affected scope of alert message are defined in clause 7 (Alert message structure) of [ITU-T X.1303bis].

A set of data elements/attributes used in distributing of alert message are shown in Table 1.

**TABLE 1.** METADATA ON TERMINAL LIST FOR DISSEMINATING ALERT MESSAGE

| Element                  | Description                                                                                    | Support/ Type                                     |
|--------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------|
| DistributionTerminalList | Container to list terminals distributing alert message.                                        |                                                   |
| TargetTerminals          | Attribute of DistributionTerminalList. Identifies target terminal to distribute alert message. | 0(optional)-*(zero or more)<br>xs:IDREF<br>Note 1 |
| TargetGroups             | Attribute of DistributionTerminalList. Identifies target group to distribute alert message.    | 0-*<br>xs:IDREF<br>Note 1                         |

NOTE 1 - Multiple occurrences (TerminalID or GroupID) are permitted, in which case the target for the distribution of alerting message are the union of all the included TerminalIDs. And, if a

digital signage terminal receives multiple alert messages with the same message identifier, CA Client should ignore the second alert message.

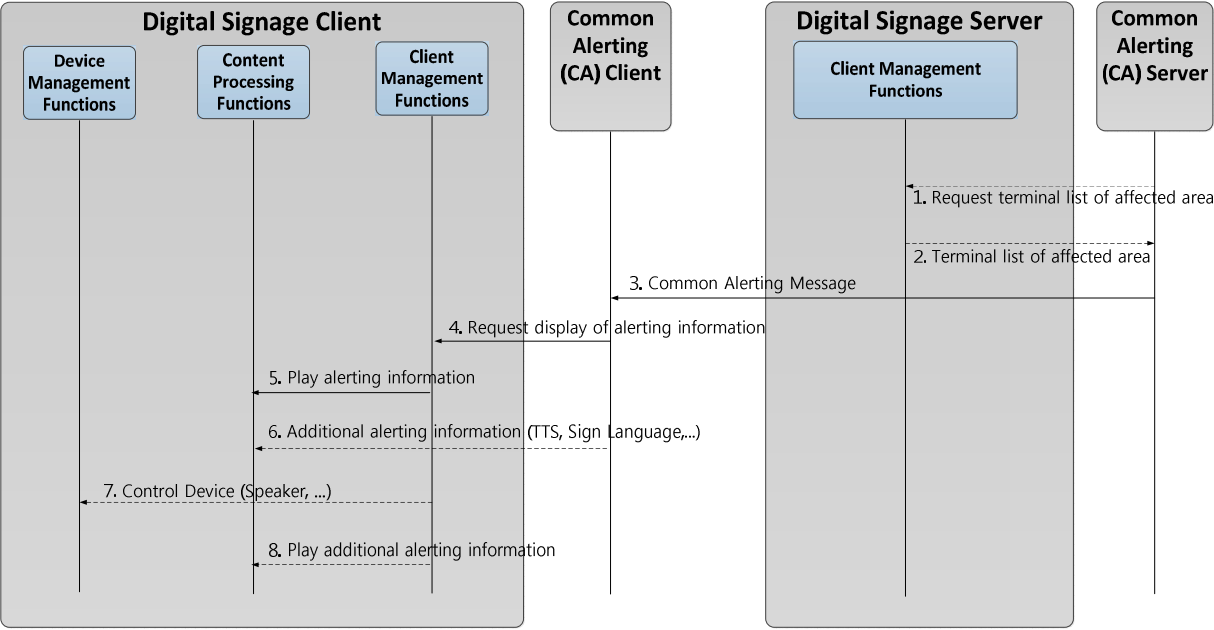


Figure 4. Procedures for display of alerting information

B. ACCESSIBILITY RELATED ALERT INFORMATION

In order to make alert message from Alert Agency more accessible to a wide audience, alert information can be converted into voice and sign language video information for blind user and hearing impaired person. In order to make alert message from Alert Agency more accessible to multilingual users, alert information in different language can also be created.

A set of data elements/attributes used for accessibility related alert information is shown in Table 2.

TABLE 2. METADATA ON ACCESSIBILITY

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div> <div> </div> <div> AccessibilityRelatedAlertInfo: Container to include the alert information for accessibility. <ul style="list-style-type: none"> <li> VoiceAlertInfo: Identifies voice alert information for blind user. <ul style="list-style-type: none"> <li> VoiceAlertLanguage: Natural language for voice alert. </li> </ul> </li> <li> SignLanguageVideoAlertInfo: Identifies sign language video alert information for hearing-impaired person. <ul style="list-style-type: none"> <li> Caption: Caption information on sign language video alert. <ul style="list-style-type: none"> <li> Caption Language: Natural language for caption on sign language video alert. </li> </ul> </li> </ul> </li> <li> ConvertedAlertInfo: Identifies converted alert information for foreigners. <ul style="list-style-type: none"> <li> ConvertedAlertLanguage: Natural language for converted alert. </li> </ul> </li> </ul> </div> </div> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

C. EMERGENCY EVACUATION RELATED INFORMATION

According to clause 7 (Alert message structure) of [ITU-T X.1303bis], the values (Shelter, Evacuate, Prepare, Execute,

Avoid, Monitor, Assess, AllClear, None) of responseType element within alert message denotes the type of action recommended for the target audience. The instruction element within alert message has the text describing the recommended action to be taken by recipients of the alert message.

In case of the emergency evacuation, it is necessary to consider emergency evacuation related additional information such as the evacuation route, evacuation direction and distance to the shelter.

A set of data elements/attributes used for emergency evacuation related information is shown in Table 3.

TABLE 3. METADATA ON EMERGENCY EVACUATION

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div> <div> </div> <div> EmergencyEvacuationRelatedInfo:Container to include the emergency evacuation related information. <ul style="list-style-type: none"> <li> EvacuationRouteInfo: Identifies emergency exit or evacuation route information to shelter. </li> <li> EvacuationDirectionIndicationInfo: A direction to a shelter from a location of the digital signage terminal. The values are Leftwards, Rightwards, Upwards, Downwards, North West, North East, South West, South East, etc. </li> <li> EvacuationDirectionIndicationSupplementaryInfo: Supplementary information such as turn information in the direction indicated by the evacuation direction indication information. The values are ←, →, ↑, ↓, ↖, ↗, ↘, ↙, etc. </li> <li> EvacuationDistanceInfo: A distance in the direction indicated by the evacuation direction indication information. 0-1. xs:nonNegativeInteger <ul style="list-style-type: none"> <li> DistanceUnit: The values are centimeter, inch, feet, meter, kilometer, mile, etc. </li> </ul> </li> </ul> </div> </div> |
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D. PRESENTATION GUIDELINE INFORMATION

According to clause 7 (Alert message structure) of [ITU-T X.1303bis], msgType and category elements within alert message denotes the kind of alert message. Severity and certainty elements collectively distinguish levels of emergency.

Nonetheless, it is better to consider more detailed presentation methods to display alert message based on the above element values. In order to display common alert information in digital signage terminal, there are three presentation methods such as overlay of screen, division of screen and sole screen.

A set of data elements/attributes used for presentation method related information is shown in Table 4.

**TABLE 4. METADATA ON PRESENTATION GUIDELINES**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div> <div>□ PresentationMethod: Container to include the presentation method related information such as overlay of screen, division of screen and sole screen. :</div> <ul style="list-style-type: none"> <li>● ScreenOverlay: General digital signage contents are overlaid with common alerting information. (Note 2) <ul style="list-style-type: none"> <li>✓ ScreenOverlayRatio: Ratio to occupy playback size of common alerting information from that of general digital signage contents (excluding common alerting information) within display device of digital signage terminal. Expressed in Percentage (%).</li> </ul> </li> <li>● ScreenDivision: Both common alerting information and general digital signage contents shares display device of digital signage terminal. (Note 2) <ul style="list-style-type: none"> <li>✓ ScreenDivisionRatio: Ratio to occupy playback size of common alerting information from that of general digital signage contents (excluding common alerting information) within display device of digital signage terminal. Expressed in Percentage (%).</li> </ul> </li> <li>● SoleScreen: Common alerting information dominates display device of digital signage terminal. (Note 2) <ul style="list-style-type: none"> <li>✓ WarningSoundInfo : Identifies warning sound information.</li> </ul> </li> </ul> </div> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

NOTE 2 – Only one element among ScreenOverlay, ScreenDivision and SoleScreen can be within the PresentationMethod.

Second, it is necessary to define the start time, duration and repeat count of presentation. Values of each element are decided according to the values of msgType, category, urgency, effective, onset and expires element defined in clause 7 (Alert message structure) of [ITU-T X.1303bis].

A set of data elements/attributes used for presentation time related information is shown in Table 5.

**TABLE 5. METADATA ON PRESENTATION TIME**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div> <div>□ PresentationTime: Container to include the presentation time related information.</div> <ul style="list-style-type: none"> <li>● StartTime: Start time to display common alerting information. If StartTime element is omitted, it means to play common alert information immediately.</li> <li>● Duration: Duration to display common alerting information. Expressed in seconds.</li> <li>● RepeatCount: Repeat number to display common alerting information. Default value is 1.</li> </ul> </div> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## VI. CONCLUSIONS

We considered how the digital signage terminal and server should operate at the alerting situation. In this paper, we described the functional architecture, information flows and metadata which are to be defined in H.DS-CASF draft recommendation to provide common alerting service among digital signage functions and alerting related functions. In the future, we will describe the detail metadata information and specific message format between CA Client and CA Server.

These standardization considerations were proposed in ITU-T SG16/Q14 standardization meeting.

## ACKNOWLEDGMENT

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