Mobile Search Framework Requirements

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Open Mobile Alliance

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1. Scope (Informative)

The requirement document (RD) contains the use cases and requirements for Mobile Search Framework Enabler. This covers defining the requirements for an open framework providing several capabilities to support mobile search service. The capabilities of this enabler will include (not limited to) Search Engine integration, selection, results Personalization.

Mobile Search Framework Enabler will reuse as much as possible existing technologies. Some requirements may involve other OMA Enablers.

Search Engines are not in the scope of this RD, nevertheless some requirements are identified for Search Engines to be integrated with the Mobile Search Framework Enabler in a standard way.

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2. References

2.1 Normative References

[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL:http://www.ietf.org/rfc/rfc2119.txt

[OMA-DPE] "Device Profile Evolution", Open Mobile Alliance™, OMA-ERP-DPE-V1_0

URL: http://www.openmobilealliance.org/

[OMA-MOBAD] "Mobile Advertising", Open Mobile Alliance™, OMA-ERP-MobAd-V1_0

URL: http://www.openmobilealliance.org/

[OMA-PRS-IMPS-AD] "Instant Messaging and Presence Service", OMA-ERP-IMPS-V1_3, Open Mobile Alliance™, URL:http://www.openmobilealliance.org/

[OMA-PRS-SIMPLE] "Presence SIMPLE", Open Mobile Alliance™, OMA-ERP-Presence_SIMPLE-V2_0

URL: http://www.openmobilealliance.org/

[OMA-ServUserProf] "Service User Profile Management", Open Mobile Alliance™, OMA-RD-Service_User_Profile_Management-V1_0

URL: http://www.openmobilealliance.org/

[OMA-SUPL] "Secure User Plane Location", Open Mobile Alliance™, OMA-ERP-SUPL-V2_0

URL: http://www.openmobilealliance.org/

[OMA-UAProf] "User Agent Profile", Open Mobile Alliance™, OMA-ERP-UAProf-V2_0_1

URL: http://www.openmobilealliance.org/

2.2 Informative References

[OMADICT] "Dictionary for OMA Specifications", Version 2.7, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_7, URL:http://www.openmobilealliance.org/

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3. Terminology and Conventions

3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

3.2 Definitions

Deep Web Databases	In the context of MSrchFramework Enabler, Deep web database is a kind of Search Engine and it refers to web database which is guarded by search interfaces and inaccessible to conventional web crawlers. Most of the pages of deep web do not exist until they are created dynamically as the result of a specific search. It may be generic or vertical/specialized (e.g. location, category etc…)
Experts	In the context of MSrchFramework Enabler, the Experts are people who are experts in a particular Q&A Field and capable of providing correct information about that Q&A Field.
Feedback	Feedback is the user explicit evaluation about the goodness of obtained results from MSrchFramework Enabler. For example by voting them (e.g. from 0 to 5) and/or leaving a comment about them and/or leaving a tag list (e.g. a list of keywords that describes the result).
Indexing Search Engine	In the context of MSrchFramework Enabler, Indexing Search Engine is a kind of Search Engine that uses indexes and web crawlers to retrieve information on the web according to the search inputs provided by the user. It may be generic or vertical/specialized (e.g. location, category etc…).
Interaction	Interaction is the action that a user performs on obtained results from MSrchFramework Enabler. Examples of Interaction are: the action to click on particular result or type of result (e.g. results of a particular brand, results with multimedia contents …), the subsequent search done, etc….
Personalization	Personalization is a process in which the MSrchFramework Enabler tailors the search results based on user related information (profile, preferences, location and other context information) to return more accurate results for that user.
Q&A Field	Q&A Field, in context of MSrchFramework Enabler, is a type of Search Domain which can be used to categorize question (in term of request) coming from user. It can also be used to categorize different Experts registered with MSrchFramework Enabler. MSrchFramework Enabler can come-up with several Q&A Fields according to Service Provider’s policies. The example of Q&A Fields may include Medical, Automobile, Aviation etc.
Q&A	Q&A, in context of MSrchFramework Enabler is a functionality which allows users to send a particular question to MSrchFramework Enabler and get answer(s) from the person (human being) who is expert in that particular Q&A Field.
Search Domain	A Search Domain is considered to be a category for search. All the incoming search requests can be categorize according to “Search Domain”. Service provider can come up with several Search Domains according to their policies. Some of the example of Search Domain would be Hotels, Shopping, Medical, etc.
Search Engine	Search Engine is a tool designed to search for different kind of content (e.g. information, images etc...). . Information provided by Search Engines to the Mobile Search Framework is in a structured form (XML documents, RSS feed …) statically organized in pages or dynamically generated at run time according to search inputs provided by the user. Information can be a content or reference to it (e.g. a web link). In this document, the term Search Engine refers to Indexing Search Engines as well as Deep Web Databases.
Search History	In the context of MSrchFramework Enabler, Search History is the collection of Feedback and Interaction from the user.
Subscribe-Push	Subscribe-Push, in context of MSrchFramework Enabler, is a functionality which enables user to subscribe for specific information providing several filtration criteria. The information is sent to the user considering all the filtration criteria.

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3.3 Abbreviations

OMA	Open Mobile Alliance
MSrchFramework	Mobile Search Framework
Q&A	Question and Answer

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4. Introduction (Informative)

With the advancement in the adoption of mobile devices by the users the need of an efficient mobile search service has evolved. Users carry their mobile devices with them all the time and would like to get the required information as and when required. The current mobile search solution suffers with various challenges for the complete value chain.

- At present there are many Search Engines which are meant to search for a specific type of content or information. For Example: a Search Engine can be deployed which can search restaurant around People's Square in Beijing. To get the accurate and appropriate information users have to remember many Search Engines. Additionally, users do not get the efficient and precise information due to the lack of context information (user profile, user preference, presence, location etc) with the Search Engines. It is impossible for Search Engines to personalize the search result without the context information.
- Search Engines mainly rely on the revenue generated by the advertisement provided with the search result. Due to the limited display of mobile devices Search Engines do not have enough space to provide advertisement so as for the mobile search they are losing a big part of revenue which they were getting in the case of internet search. The Search Engines have to look for some alternative source of revenue for providing search services to the mobile devices.
- Operators who are not involved in the mobile search service may have the risk to work only as a bridge between the users and the Search Engines in mobile search services. In this case, users type in a direct url to access a specific Search Engine and the Operators just forward the search request to Search Engines and response to users respectively but they could do more to promote the search service.
- Information is distributed in different places and maintained by different applications/engines. This information is not always available on the public internet and cannot be accessed by generic Search Engines.

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5. MSrchFramework release description (Informative)

MSrchFramework Enabler is an enabler release which can facilitate mobile search service.

To tackle the drawback of the current mobile search service it is required to define an open framework which integrates the capabilities of different Search Engines. In this context this requirement document (RD) intends to provide requirements and use cases which are meant to be considered in the further development (AD, TS) of this enabler.

The following figure shows the actors for the MSrchFramework Enabler.

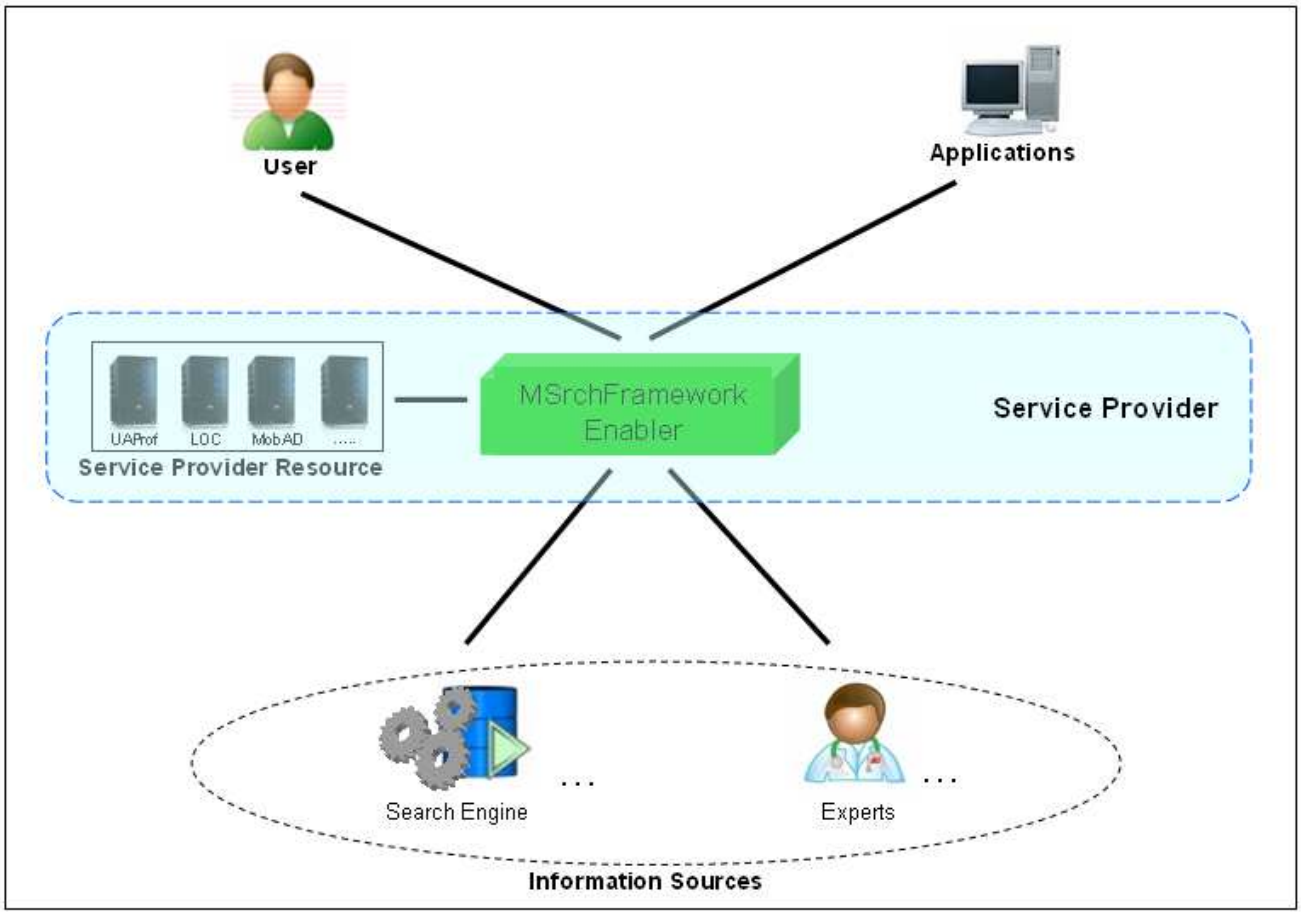

Figure 1: Actors diagram

Service Provider: The Service Provider offers the mobile search service to Users via the MSrchFramework Enabler. The Service Provider configures and maintains the MSrchFramework Enabler and manages the Service Provider Resources, the User Information (e.g. user profile, user context…) and the Search Engines/Experts related information (e.g. expertise, location, and request interface). The Service Provider interacts with the Information Sources (Search Engines/Experts) in order to provide the right information to Users.

Service Provider Resources: The Service Provider Resources are the different kind of information/content maintained by the Service Provider. Part of those resources can be supplied by other OMA enablers which MSrchFramework Enabler may interact with in order to perform some functions. Examples of those other Enablers can be (not exhaustive): SUPL (location), Presence (presence status), MobAd (target advertisement), ServUserProf (Service User Profile Management), UAProf (device capabilities), DPE (dynamic device capabilities, phone profile).

Information Source: The Information Sources provide the information/content to the MSrchFramework Enabler requested by Users. Two Information Sources indentified are Search Engines and Experts.

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User: The User consumes personalized mobile search service, offered by the Service Provider, interacting with the MSrchFramework Enabler. The User can also use additional functionalities exposed by the MSrchFramework Enabler, such as (not exhaustive): Subscribe-Push to subscribe himself for specific information providing several filtration criteria, Query & Answer to ask a question and get answer(s) from the Expert(s), Search History to express him Feedback about obtained results and get recommendations.

5.1 Version 1.0

The MSrchFramework Enabler v1.0 defines a framework that allows offering a mobile search service.

The main functionalities exposed by the MSrchFramework Enabler v1.0 are the integration with the Information Sources such as Search Engines, the personalisation of the results using User Information, the support of some functionalities such as: Q&A, Subscribe-Push, Search History & recommendation, multimedia inputs.

All the functionalities of this release are explained in section 6.1 (Modularization).

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6. Requirements (Normative)

6.1 Modularisation

The following functional modules are identified for the MSrchFramework Enabler.

1. Search Engine Integration: This module collects the capabilities of MSrchFramework Enabler about how a Search Engine will be incorporated in MSrchFramework Enabler. It includes Search Engine interaction (e.g. Search Engine registration, Search Engine information updates), Search Engine selection, result merging etc.
2. Personalization: This module collects the capabilities of MSrchFramework Enabler to provide personalized results.
3. Application support: This module collects the capabilities of MSrchFramework Enabler to allow application/services to initiate a search request. This will allow application/services to use the search capabilities of this enabler while serving their customers.
4. Interworking: This module collects the capabilities of MSrchFramework Enabler about the communication means between different instances of MSrchFramework Enabler enabling the Interworking among them.
5. Multimedia Support: This module collects the capabilities of MSrchFramework Enabler to support multimedia as input for the search request.
6. Q&A: This module collects the capabilities of MSrchFramework Enabler required to provide Q&A functionality.
7. Subscribe-Push: This module collects the capabilities of MSrchFramework Enabler to make Subscribe-Push functionality available.
8. Search History & Recommendations management: This module collects the capabilities of MSrchFramework Enabler to manage Search History and recommendations functionalities.
9. Request management: This module collects capabilities of MSrchFramework Enabler to manage (handled, distribute, optimize, …) the incoming requests for a better processing and understanding by the different entities of the enabler.

6.2 High-Level Functional Requirements

Label	Description	Release	Functional module
MSrchFramework-HLF-001	MSrchFramework Enabler SHALL support content searching based on user preference information	MSrchFramework 1.0	Personalization
MSrchFramework-HLF-002	MSrchFramework Enabler SHALL support searching a record among the content library of mobile entertainment services. (e.g. Mobile TV, Music Downloading, Ring Tone, etc.) if the Search Engine has access to the mobile entertainment services content.	MSrchFramework 1.0	Request Management
MSrchFramework-HLF-003	MSrchFramework Enabler SHALL support search a communication record among text-based communication services if the Search Engine has access to the text-based communication services content.	MSrchFramework 1.0	Request Management
MSrchFramework-HLF-004	MSrchFramework Enabler SHALL provide mechanisms to allow an application (in the same or different domain) to initiate a search request on behalf of the user.	MSrchFramework 1.0	Application Support
MSrchFramework-HLF-005	MSrchFramework Enabler SHALL allow sending search results to the user directly in case of application initiated search request.	MSrchFramework 1.0	Application Support
MSrchFramework-HLF-006	MSrchFramework Enabler SHALL provide query interfaces (adaptable to some extent) for accessing different Search Engines.	MSrchFramework 1.0	Search Engine Integration

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MSrchFramework -HLF-007	MSrchFramework Enabler SHALL provide mechanisms to target search request to the Search Engines registered with different instances of MSrchFramework Enabler.	MSrchFramework 1.0	Interworking, Search Engine Integration
MSrchFramework -HLF-008	It SHALL be possible to consider the Search Engines registered with other instances of MSrchFramework Enabler while selecting the appropriate Search Engine(s).	MSrchFramework 1.0	Search Engine Integration Interworking
MSrchFramework -HLF-009	MSrchFramework Enabler SHALL allow query building (e.g. transforming the query in a format understandable by the Search Engine) before sending the query to the Search Engines.	MSrchFramework 1.0	Request Management Search Engine Integration
MSrchFramework -HLF-010	MSrchFramework Enabler SHOULD allow merging queries from different users according to the service provider/operator rules or policies.	MSrchFramework 1.0	Request Management
MSrchFramework -HLF-011	MSrchFramework Enabler SHOULD allow generating separate queries out of a single request according to the service provider/operator rules or policies.	MSrchFramework 1.0	Request Management
MSrchFramework -HLF-012	MSrchFramework Enabler SHALL allow selecting an appropriate Search Engine(s) for a particular search request. The criteria for selection may include (not limited to) user location, Search Domain, Search Engine expertise, user preference etc.	MSrchFramework 1.0	Search Engine Integration
MSrchFramework -HLF-013	MSrchFramework Enabler SHALL allow Search Engine registration with some Search Engine specific information (e.g. the query interfaces, Search Domain, etc.)	MSrchFramework 1.0	Search Engine Integration
MSrchFramework -HLF-014	MSrchFramework Enabler SHALL allow Search Engine de-registration.	MSrchFramework 1.0	Search Engine Integration
MSrchFramework -HLF-015	MSrchFramework Enabler SHALL allow results Personalization using context information like (not limited to) user profile, location, presence etc. before sending them to the user.	MSrchFramework 1.0	Personalization
MSrchFramework -HLF-016	MSrchFramework Enabler SHALL allow aggregating and elaborating (e.g. complementing with advertisement, merging) the results provided by different Search Engines.	MSrchFramework 1.0	Search Engine Integration Personalization
MSrchFramework -HLF-017	MSrchFramework Enabler SHALL allow multimedia inputs for the search requests.	MSrchFramework 1.0	Multimedia Support
MSrchFramework -HLF-018	MSrchFramework Enabler SHOULD provide mechanisms to make user related information (profile, preferences, location and other context information) available to the Search Engine(s). **Informational Note:** This requirement is not mandatory because it depends on the agreement between the service provider and Search Engine.	MSrchFramework 1.0	Search Engine Integration Personalization
MSrchFramework -HLF-019	MSrchFramework Enabler SHALL provide Q&A functionality, integrating various Experts from different Q&A Fields.	MSrchFramework 1.0	Q&A
MSrchFramework -HLF-020	MSrchFramework Enabler SHALL enable Experts registration with some Experts related information	MSrchFramework 1.0	Q&A
MSrchFramework -HLF-021	MSrchFramework Enabler SHALL enable Experts de-registration.	MSrchFramework 1.0	Q&A

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MSrchFramework-HLF-022	MSrchFramework Enabler SHALL enable answers optimization (e.g. sorting based on skill level of the Experts, remove redundancy, check result format conversion, etc.) for the better and efficient service.	MSrchFramework 1.0	Q&A Personalization
MSrchFramework-HLF-023	MSrchFramework Enabler SHALL provide Subscribe-Push functionality.	MSrchFramework 1.0	Subscribe-Push
MSrchFramework-HLF-024	MSrchFramework Enabler SHALL enable delivery of targeted advertisements with the search results.	MSrchFramework 1.0	Personalization
MSrchFramework-HLF-025	MSrchFramework Enabler SHALL provide mechanisms for the user to express and update (e.g. modify, delete …) Feedback about obtained result. Note: Feedback can be a comment, a list of tags and/or a vote.	MSrchFramework 1.0	Search History & Recommendation
MSrchFramework-HLF-026	MSrchFramework Enabler SHALL store obtained Feedback / Interaction as part of the Search History.	MSrchFramework 1.0	Search History & Recommendation
MSrchFramework-HLF-027	MSrchFramework Enabler SHALL associate the Feedback / Interaction to the specific user.	MSrchFramework 1.0	Search History & Recommendation
MSrchFramework-HLF-028	MSrchFramework Enabler SHALL allow use of Search History (Feedback, Interaction) to personalize search results (e.g. for selecting recommended results, for sorting results, etc…).	MSrchFramework 1.0	Personalization Search History & Recommendation
MSrchFramework-HLF-029	MSrchFramework Enabler SHALL allow use of Search History (Feedback, Interaction) and user related information (profile, preferences, location and other context information) to provide recommended results out of the results received from Search Engine(s).	MSrchFramework 1.0	Personalization Search History & Recommendation
MSrchFramework-HLF-030	MSrchFramework Enabler SHALL allow the user to get recommended results with the search results.	MSrchFramework 1.0	Personalization Search History & Recommendation
MSrchFramework-HLF-031	MSrchFramework Enabler SHALL allow users to get an answer from the answers already provided by the Experts. While sending the request (Question) user may opt for getting answers out of the answers which might be already provided for this particular question.	MSrchFramework 1.0	Q&A
MSrchFramework-HLF-032	MSrchFramework Enabler SHALL provide (e.g. depending on the context information User Preference, Location etc) Search Domain(s) for a request about which no Search Domain is specified by the user.	MSrchFramework 1.0	Request Management
MSrchFramework-HLF-033	MSrchFramework Enabler SHALL support mechanisms for the user to subscribe/unsubscribe for specific information by providing/updating one or more filtration criteria (e.g. sports, weather forecast, …) , in the context of Subscribe-Push functionality.	MSrchFramework 1.0	Subscribe-Push

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MSrchFramework -HLF-034	MSrchFramework Enabler SHALL support several filtration criteria for Subscribe-Push functionality such as: • search keyword (“football”), • location, • pushing interval (“daily basis”, daily time-slot, week days, week-end days…), ▪ only rated results (based on users Feedback/Interaction) • context, • etc…	MSrchFramework 1.0	Subscribe-Push

Table 1: High-Level Functional Requirements

6.2.1 Security

Label	Description	Release	Functional module
MSrchFramework -SEC-001	MSrchFramework Enabler SHALL support mechanisms for secure delivery of results to the user..	MSrchFramework 1.0	All

Table 2: High-Level Functional Requirements – Security Items

6.2.1.1 Authentication

Label	Description	Release	Functional module
MSrchFramework -AUC-001	MSrchFramework Enabler SHALL support mechanisms to authenticate request for changing Search Engine information.	MSrchFramework 1.0	Search Engine Integration
MSrchFramework -AUC-002	MSrchFramework Enabler SHALL support mechanisms to authenticate request for changing Experts information.	MSrchFramework 1.0	Q&A
MSrchFramework -AUC-003	MSrchFramework Enabler SHALL support mechanisms to authenticate request coming from a different instance of MSrchFramework Enabler.	MSrchFramework 1.0	Interworking
MSrchFramework -AUC-004	MSrchFramework Enabler SHALL support authentication of the Search Engine while Search Engine registration/de-registration.	MSrchFramework 1.0	Search Engine Integration

Table 3: High-Level Functional Requirements – Authentication Items

6.2.1.2 Authorization

Label	Description	Release	Functional module
MSrchFramework -AUT-001	MSrchFramework Enabler SHALL support mechanisms to authorize requests coming from a different instance of MSrchFramework Enabler.	MSrchFramework 1.0	Interworking
MSrchFramework -AUT-002	MSrchFramework Enabler SHALL support mechanisms to authorize request for changing Search Engine information.	MSrchFramework 1.0	Search Engine Integration

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MSrchFramework -AUT-003	MSrchFramework Enabler SHALL support mechanisms to authorize request for changing Experts information.	MSrchFra mework 1.0	Q&A
MSrchFramework -AUT-004	MSrchFramework Enabler SHALL support mechanisms to authorize search request initiated by an application. (e.g. running inside the handset or present in the network)	MSrchFra mework 1.0	Application Support

Table 4: High-Level Functional Requirements – Authorization Items

6.2.1.3 Data Integrity

No requirement identified.

6.2.1.4 Confidentiality

No requirement identified.

6.2.2 Charging

Label	Description	Release	Functional module
MSrchFramework -CHG-001	MSrchFramework Enabler SHALL facilitate charging based on at least the following: ▪ Type of functionality provided (Q&A, Subscribe-Push, etc.) ▪ Request coming from an instance of MSrchFramework Enabler in a different domain. ▪ Application sending request to the MSrchFramework Enabler. ▪ Context information being provided to the Search Engines.	MSrchFra mework 1.0	All

Table 5: High-Level Functional Requirements – Charging Items

6.2.3 Administration and Configuration

Label	Description	Release	Functional module
MSrchFramework -ADM-001	MSrchFramework Enabler SHALL provide mechanisms allowing Experts to update their information provided at the time of registration.	MSrchFra mework 1.0	Q&A
MSrchFramework -ADM-002	MSrchFramework Enabler SHALL provide mechanisms allowing users to update their filtration settings in the context of Subscribe-Push functionality.	MSrchFra mework 1.0	Subscribe-Push
MSrchFramework -ADM-003	MSrchFramework Enabler SHALL provide mechanisms allowing Search Engines to update their information provided at the time of registration.	MSrchFra mework 1.0	Search Engine Integration

Table 6: High-Level Functional Requirements – Administration and Configuration Items

6.2.4 Usability

No requirement identified.

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6.2.5 Interoperability

No requirement identified: see requirements related to Interworking module.

6.2.6 Privacy

Label	Description	Release	Functional module
MSrchFramework -PRV-001	MSrchFramework Enabler SHALL permit the user to determine which user related information (profile, preference, location and other context information) might be made available to the Search Engine(s).	MSrchFramework 1.0	All
MSrchFramework -PRV-002	MSrchFramework Enabler SHALL provide mechanisms to not reveal user's actual identification (MSISDN, IMSI, IMEI, any other kind of user identification) to the Search Engines(s).	MSrchFramework 1.0	All

Table 7: High-Level Functional Requirements – Privacy Items

6.3 Overall System Requirements

No requirement identified.

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Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
Approved Version OMA-RD-MSrchFramework-V1_0	31 Jul 2012	Status changed to Approved by TP: TP ref#: OMA-TP-2012-0292-INP_MSrchFramework_V1_0_ERP_for_Final_Approval

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Appendix B. Use Cases (Informative)

B.1 Content Searching based on user preference information

This use case demonstrates how MSrchFramework Enabler can provide results based on specific users preferences.

B.1.1 Short Description

The subscriber used the search client to search some information providing keywords like “bar“.

The subscriber click “send” button or hyperlink and send the search request as a search input to MSrchFramework Enabler.

MSrchFramework Enabler send the searching request to the Search Engines, and the Search Engine returns the results back.

MSrchFramework Enabler consults the enablers that hold the user’s preference information, such as ServUserPorf.

MSrchFramework Enabler finds that subscriber prefers sports bar rather than music bar.

MSrchFramework Enabler processes search results and produces consolidated results.

The results are sent back to the subscriber.

B.1.2 Market benefits

A smart and reasonable search function may give the subscribers a good service experience. And this may boost the market acceptance of mobile searching services. The content provider and operators may benefit from the increased consumption for contents.

B.2 Communication Search

This use case demonstrates the abilities that MSrchFramework Enabler helps subscriber to find a communication record among the text-base communication services which he / she used, with some keywords, and optionally some other conditions, such as a time scope.

B.2.1 Short Description

The subscriber uses the communication search tool with some keywords and an optional time scope on his / her device.

The communication search tool sends the query to MSrchFramework Enabler.

The MSrchFramework Enabler finds the certain Search Engine(s) and sends the query to it / them.

The Search Engines searches the subscriber’s communication records and returns the result set to the MSrchFramework Enabler.

The MSrchFramework Enabler incorporates the result sets and returns to the communication search tool.

The communication search tool shows the records to the subscriber in brief.

The subscriber could easily open the record with corresponding communication service to read the whole message.

B.2.2 Market benefits

A unified and easy to use communication search tool may give the subscribers a good service experience. And this may boost the acceptance of text-based mobile messaging services.

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B.3 Application initiated search

This use case describes how an application/service can use the search capabilities of MSrchFramework Enabler.

B.3.1 Short Description

Precondition

Alice is subscribed for a "Touring" service provide by SP1. In which she just have to provide her tour "date" and "place" to get all the relevant information like flight/train/bus schedule, hotels nearby, main shopping places etc.

Mobile search service (using MSrchFramework Enabler) is provided by SP2

Normal Flow

Alice is planning to visit Beijing on 22nd Nov 2009. She sends a related request to the Touring service. Touring service forms a search request(s) and send it to SP2, utilizing the interface provided by the MSrchFramework Enabler. SP2 searches for the appropriate contents as per the policies (what all information to provide) between SP1 and SP2. The results are then provided to the user.

B.3.2 Market benefits

The search capabilities of this enabler can be provided to the user indirectly through other applications/service.

B.4 Query Optimization

This use case describes various methods to optimize users query for better result and efficiency.

B.4.1 Short Description

After receiving a search request form the user(s) and selecting the appropriate Search Engine(s) the following optimizations may be done (not limited to) by the MSrchFramework Enabler on the query:

1. Query Building: The user query will be transform in a format registered by the Search Engine as its acceptable query format.
   - For example: While registration Search Engine XYZ registered its acceptable query format (in URL) as "http://example.com/?q={searchTerms}&pw={startPage?}/>" whereas Search Engine ABC registered as "http://example.com/?qw={searchTerms}&sp={startPage?}&tr={totalRecords}". This implies that the query that is to be send to the Search Engine must be inline with this format otherwise Search Engines won't be able to process the query. For the sake of clarity, the intended queries generated for the individual Search Engines would be:
     - For XYZ: http://example.com/?q=computer/>
     - For ABC: http://example.com/?qw=computer&tr=10
2. Query Merge: Two queries from the different user about the same Search Domain can be merged together into one single query
   - For example: Two search requests ("acer", "lenovo") may relate to the same Search Domain i.e. "Computers". In this case it would be feasible to join these two requests and send one consolidated query to the Search Engine(s) instead of several queries.
3. Query Split: One query which can relate to two different Search Domains can be spitted into two separate queries.
   - For example: One search request ("apple") may relate to different Search Domain i.e. "Fruits" and "Electronics". In this case it will be feasible to generate two different queries pertaining to each domain for the respective Search Engines.

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B.4.2 Market benefits

Different requirements of different Search Engines about the acceptable request format could become transparent to the users.

Search Engines will never get an invalid query resulting in a NULL result set or an error.

B.5 Personalized Multimedia Search

This use case describes how a multimedia can be accepted as the input for the search request and how the results are personalized.

B.5.1 Short Description

This use case covers the following aspects

1. A multimedia input for the search request: User can send an image as the input for the search request. User can also provide some metadata related with the image for example “Red”, “Silk”.
2. Search Engine selection: A proper Search Engine can be selected for the particular request. For example if the user’s current location is “Ocean Park in Hong Kong” then a Search Engine which is meant to serve in Hong Kong (or even for ocean park) will be selected.
3. Personalization: After getting search results from different Search Engines the results can be aggregated to produce the consolidated list for the user. Before sending the results to the user, Personalization can also be done using context information like, not limited to, user profile, location, presence etc.

B.5.2 Market benefits

User will get the more accurate search result in terms of their location and preference. They can search about multimedia content (image, audio) easily.

B.6 Q&A

This use-case describes a special kind of mobile search facility which enables the users to send a question to the MSrchFramework Enabler requesting an answer. It shows not only the Search Engines can work together with MSrchFramework Enabler, but also the Experts pertaining to different Q&A Fields can also be integrated with MSrchFramework Enabler.

B.6.1 Short Description

According to this use case a user can send a request as a question to the server. Server will find an Expert(s) (pertaining to a specific Q&A Field) to answer that question. The Expert(s) will send the answer as a response to the server. The following operations may be performed by the server before sending the answers back to the user.

1. Answers can be sorted depending on the skill level of the Experts: Experts skill level can be ascertain according to the SP policies. It may involve an examination/interview at the time of Expert registration resulting in the skill level of the Expert.
2. Duplicate answers can be removed.

B.6.2 Market benefits

It will enable integrating not only Search Engines but professional people from various Q&A Fields facilitating better service for the user. It will also enable users to get the latest information from the Experts of the particular Q&A Field.

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B.7 Subscribe-Push

This use case describes a kind of mobile search service which enable user to subscribe for specific information/content providing several filtration criteria.

B.7.1 Short Description

User can subscribe for specific information providing several filtration criteria. Filtration criteria may include search keyword ("football"), pushing interval ("daily basis") etc.

Server can initiate a search request, as per the filtration criteria, periodically and push the results back to the user. Before pushing, server may perform Personalization on the search results according to the context information (user profile, preferences, etc.)

Server may also provide targeted advertisement with the pushed result. A targeted advertisement implies a personalized advertisement using context information (LOC, preference, user profile etc.) The targeted advertisement is considered to be more useful than a general advertisement. For example: user has subscribed for NBA news on daily basis and his/her current location is Ocean Park, Hong Kong. An advertisement from a merchant (based in Ocean Park) who is selling tickets for an upcoming NBA event will be very appreciated by the user.

B.7.2 Market benefits

User won't have to initiate a search request for some information which they need frequently.

B.8 Search History Management

This use case describes the capabilities of MSrchFramework Enabler to store and maintain the Search History which can be further used for result Personalization.

It describes the capability that MSrchFramework Enabler provides to the user for voting the goodness of a result that MSrchFramework Enabler has reported to him. The user can rate it expressing a vote and, optionally, leave a comment about the results provided by the MSrchFramework Enabler.

B.8.1 Short Description

There can be many ways to store and maintain the Search History. This use case describes the two most prominent ways as follows.

1. User Feedback
   a. The user sends a search request to the MSrchFramework Enabler.
   b. MSrchFramework Enabler processes the request, selects Search Engine(s) and sends it/them the formatted query (see "Query optimization" use case), processes search results, produces consolidated results (by applying Personalization function, see "Personalized Multimedia Search" use case) and provides the results to the user.
   c. The user, after consulting results, can express his evaluation of the goodness of obtained results, by voting them (e.g. from 0 to 5) and/or leaving a comment about them and/or leaving a tag list (e.g. a list of keywords that describe the result).
   d. MSrchFramework Enabler stores obtained Feedback.

2. User Interaction
   a. When results are provided to the user, user entertains (clicks and go to the actual content/Info) few of them. User selects particular brand (Adidas) every time.

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b. MSrchFramework Enabler stores this selection: the type of results/content user frequently entertain can be considered as a user preference. E.g. user searches for sports T-shirts, the results are provided pertaining to several sports brands. Adidas can further be considered as the preferred sports brand for the user.

B.8.1.1 Alternative flow

The same capability can be used by the MSrchFramework Enabler to evaluate achieved service quality by collecting Feedback from the user about provided service (e.g. about the results list, benefit of results, response speed, etc…).

B.8.2 Market benefits

A good service experience is done to the user, by allowing him to be active in using the service.

The service provider can control the quality of the offered service.

B.9 Recommendation

This use case describes the capability of MSrchFramework Enabler to manage user's Feedback (see "Search History Management" use case) in order to use them as criteria for recommended results to users.

B.9.1 Short Description

The user sends a search request to the MSrchFramework Enabler.

MSrchFramework Enabler processes the request, selects Search Engine(s) and sends it/them the formatted query (see "Query optimization" use case) and processes search results.

MSrchFramework Enabler processes stored Feedback (see "Search History Management" use case) and provide appropriate recommendations with the search results applying one or more recommendation algorithms. MSrchFramework Enabler produces consolidated results (by applying Personalization function, see "Personalized Multimedia Search" use case) and provides the results to the user.

B.9.1.1 Alternative flow

The same capability can be used to allow users to ask only for recommended results.

B.9.2 Market benefits

A good service experience is done to the user, by presenting him personalized recommendations for information, products or services during a search request.

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