



Maritime Identity Registry (MIR) and Maritime Service Registry (MSR)

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What is the Maritime Identity Registry (MIR)?



- The MIR is responsible for identity management and providing security functionality to the entities of the MCP
- Standardized in IALA G1183 and conforms to the PKI requirements of SECOM
- Provides the following functionality
 - Identity management for maritime entities (users, vessels, devices, etc.)
 - Public Key Infrastructure (PKI)



Identity Management in the MIR



- Makes it possible to register any maritime entity to give it a unique digital identity
- All registered entities are given a unique identifier in the form of a Maritime Resource Name (MRN)
- For an identity representing a vessel information such as IMO number, MMSI, etc. can also be assigned to the identity



Public Key Infrastructure (PKI)



- Makes it possible to assign a cryptographic identity to any entity that is registered in the MIR in the form of a public/private key-pair and a digital certificate
- Follows common PKI standards
 - RFC 5280 for X.509v3 certificates and certificate revocation lists (CRL)
 - RFC 6960 for Online Certificate Status Protocol (OCSP)
- Certificate content and cryptographic requirements follow IALA G1183
- Can be used for machine-to-machine communication where authentication and/or authorization is needed



Certificate content - DN



Table 1: Subject distinguished names fields

| Field | User | Vessel | Device | Service | AtoN | Organization |
|--------------------|---------------------------|-------------|-------------|------------------------|-----------|--------------------|
| MCP-TYPE | "entity" | "entity" | "entity" | "entity" | "entity" | "entity" |
| CN (CommonName) | Full name | Vessel name | Device name | Service Domain Name | AtoN name | Organization Name |
| O (Organization) | Organisation MRN | | | | | |
| E (Email) | User email | | | | | Organization email |
| C (Country) | Organization country code | | | | | |
| UID | Entity MRN | | | | | |



Certificate content - SAN



Table 2 Suggested defined fields and their usage by entity kinds

| Field | OID | Used by |
|------------------|--|-------------------|
| Flagstate | 2.25.323100633285601570573910217875371967771 | Vessels, Services |
| Callsign | 2.25.208070283325144527098121348946972755227 | Vessels, Services |
| IMO number | 2.25.291283622413876360871493815653100799259 | Vessels, Services |
| MMSI number | 2.25.328433707816814908768060331477217690907 | Vessels, Services |
| AIS shiptype | 2.25.107857171638679641902842130101018412315 | Vessels, Services |
| Port of register | 2.25.285632790821948647314354670918887798603 | Vessels, Services |



Certificate content - SAN



| | | |
|---------------|--|-----------------------------------|
| Ship MRN | 2.25.268095117363717005222833833642941669792 | Services |
| MRN | 2.25.271477598449775373676560215839310464283 | Vessels, Users, Devices, Services |
| Permissions | 2.25.174437629172304915481663724171734402331 | Vessels, Users, Devices, Services |
| Alternate MRN | 2.25.133833610339604538603087183843785923701 | Vessels, Users, Devices, Services |
| URL | 2.25.245076023612240385163414144226581328607 | |



MIR Reference Implementation



- Licensed under the Apache 2.0 license
- MIR PKI Library
 - Provides the cryptographic functionality that is necessary for creating and handling MCP certificates
 - <https://github.com/maritimeconnectivity/MCP-PKI>
- MIR API
 - REST API for managing maritime identities and certificates
 - <https://github.com/maritimeconnectivity/IdentityRegistry>
- MIR ID Broker
 - Keycloak with custom MIR specific SPIs providing token based authentication based on OpenID Connect (OIDC) for use with MIR and MSR APIs
 - <https://github.com/maritimeconnectivity/MCPKeycloakSpi>



MIR API



- REST API for managing maritime identities and certificates
- Requires authorization with either an OIDC token from the MIR ID Broker or a certificate previously issued by the MIR
- OIDC authorized version of API
 - <https://api.maritimeconnectivity.net/v3/api-docs/mcp-idreg-oidc>
- Certificate authorized version of API
 - <https://api-x509.maritimeconnectivity.net/v3/api-docs/mcp-idreg-x509>



MIR Demo



What is the Maritime Service Registry (MSR)?



- The MSR is responsible for providing discoverability of digital services, such as navigational warnings, VTS, etc.
- Standardized in IALA G1191 and conforms to the service discoverability requirements of SECOM
- Uses IALA G1128 as the foundation for describing service instances; endpoint, geographical coverage, service provider information, etc.
- Provides the following functionality:
 - Service registration for digital service providers
 - Service discoverability for digital service consumers
 - Local search in a single MSR
 - Global search across multiple MSRs using MMS for propagation



Types of global search



Search across the globe

- Search for certain services all over the globe
- Search request is propagated to all MSRs participating in global search
- All results matching the search parameters are returned

Search based on geometry

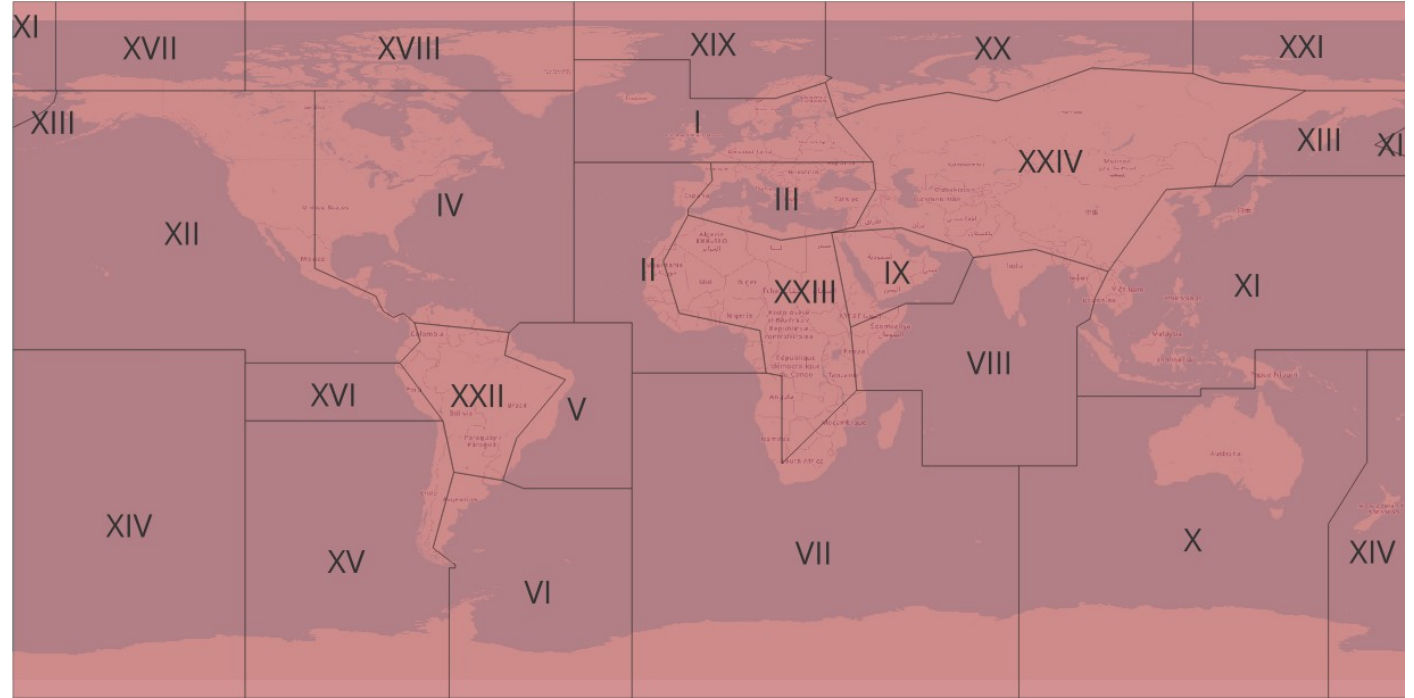
- Search for certain services in a specified area
- Search request is **only** propagated MSRs offering services in the area(s) of interest
- Results that are matching the search parameters **and** cover the area of interest are returned



The concept of Search Areas



- We need to split the world somehow
- Chosen to split the world based on NAVAREAs
- Extension of areas now cover inland waterways
- In the GMSP, this allows for geographical service discovery – also when navigating through inland waterways





Finding S-124 services along a route

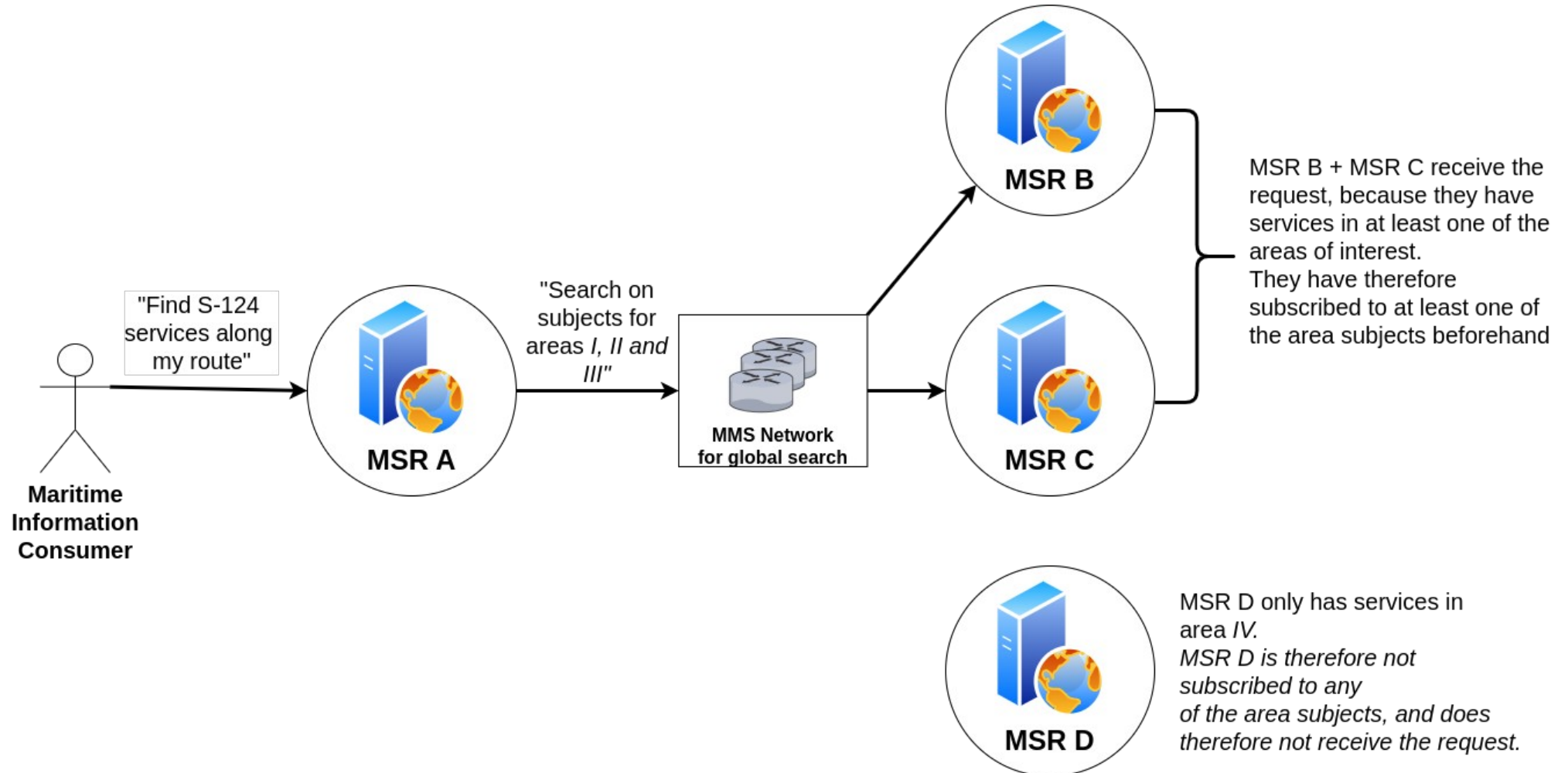




Finding S-124 services along a route



Search request propagation flow





MSR Reference Implementation



- Licensed under the Apache 2.0 license
- <https://github.com/maritimeconnectivity/ServiceRegistry>



MSR API



- MCC Public Demonstrator
 - <https://msr.maritimeconnectivity.net/v3/api-docs>
 - <https://msr.maritimeconnectivity.net/api/secom/openapi.json>
- MCC TEST Environment (compatible with G1191)
 - <https://msr-test.maritimeconnectivity.net/v3/api-docs>
 - <https://msr-test.maritimeconnectivity.net/api/secom/openapi.json>



MSR Demo