PAWS WG
IETF-82

Device to Database Protocol for White Space

<draft-das-paws-protocol-00.txt>

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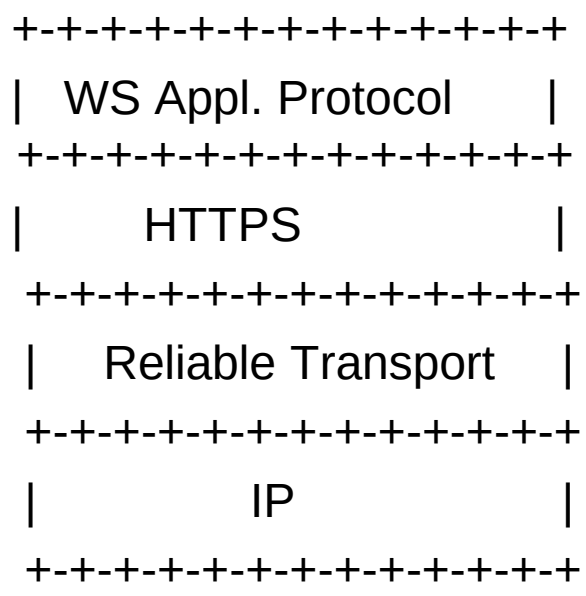
Outline

- Introduction
- Protocol layer
- Protocol Features/Functionalities
- Encoding Considerations
- Security Consideration

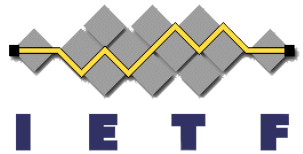
Introduction

- Whitespace protocol must satisfy the requirements that are specified by the regulatory authorities (e.g. FCC/Ofcom and so on) . For example, some US specific FCC requirements are:
  - The TVWS devices are required to periodically access the TV Whitespace Database to obtain the list of available TV frequencies (channels) that could be utilized at their location.
  - Along with the list of frequencies/channels, the database should also return maximum permissible power levels that could be used by the TVWS devices.
  - Fixed and Mode II devices are required to access TVWS database every 24 hours to get a list of available TV bands.
  - The Mode II device must additionally do the same upon power-up, and whenever they change their position by 50 meters or more.
  - When a Fixed or Mode II device will serve as an access point for Mode I devices, the serving Fixed or Mode II must check with the TVWS database to ensure that the specified Mode I devices are valid devices at the given location. Initiate the protocol design/framework discussion

Protocol Layer



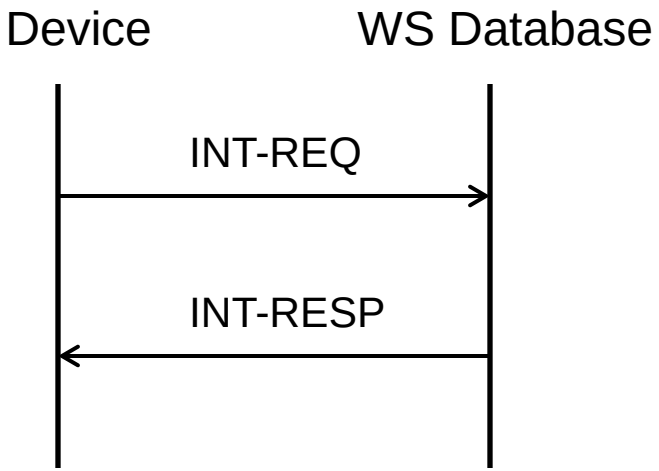
Protocol Features/Functionalities



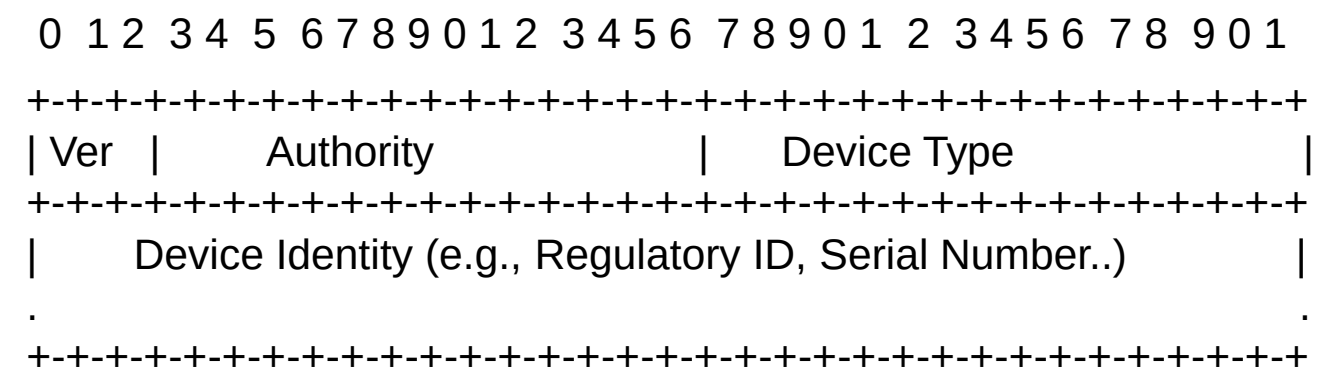
- Device Bootstrapping
- Device Registration
- Querying the Database
- Device Validation
- …..

Device Bootstrapping

- Device bootstrapping is the process whereby device establishes an initial connection to the database



INT-REQ Message Format



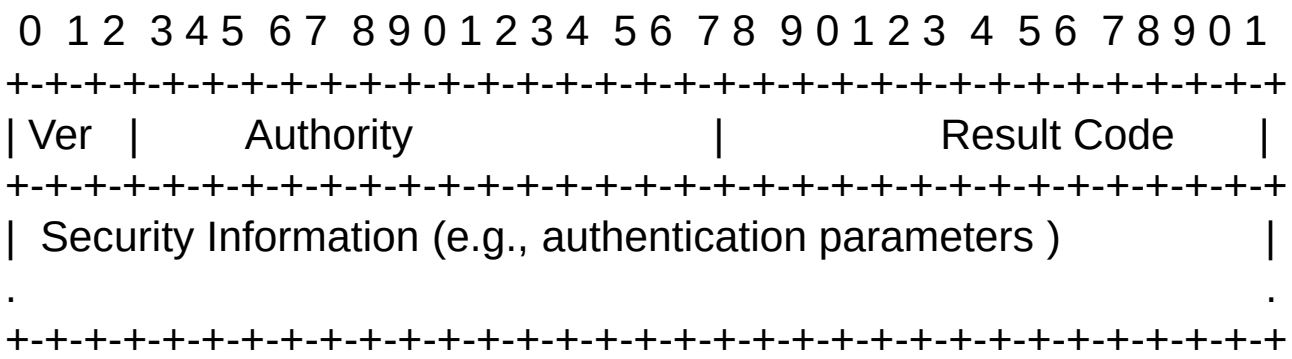
Ver - Protocol version

Authority - Indicates the regulatory rules that need to be applied to the device

Device Type - Type of devices , for example, in US FCC rules this is called Fixed or Mode II device

Device Identity - Information that identifies the class of device (e.g., FCC ID in case of US, Manufacturer Serial number, and so on)

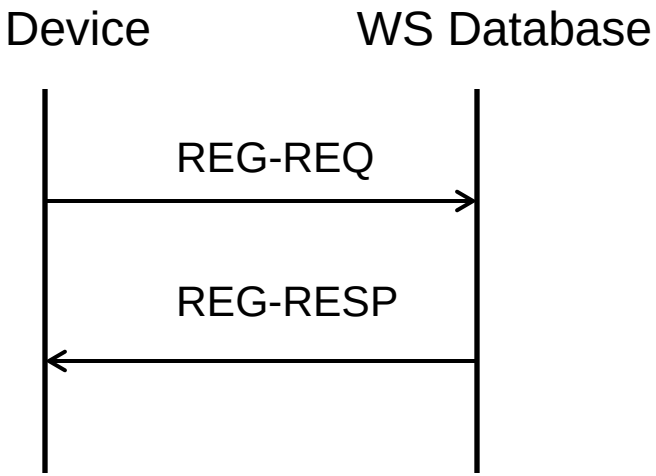
INT-RESP Message Format



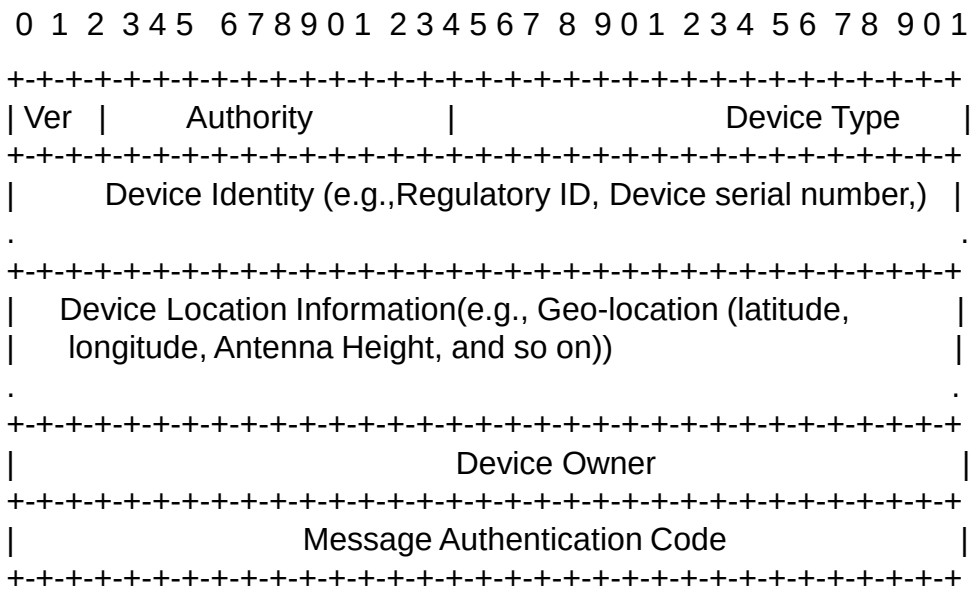
Ver - Protocol version
Authority - Indicates the regulatory rules that need to be applied to the device
Result Code - Indicates success or failure
Security Information - Information required to initiate the authentication process or perform the capability negotiation

Device Registration

- Device registration is the process of a device establishing certain operational parameters with the database, as required by the spectrum management authority.



REG-REQ Message Format



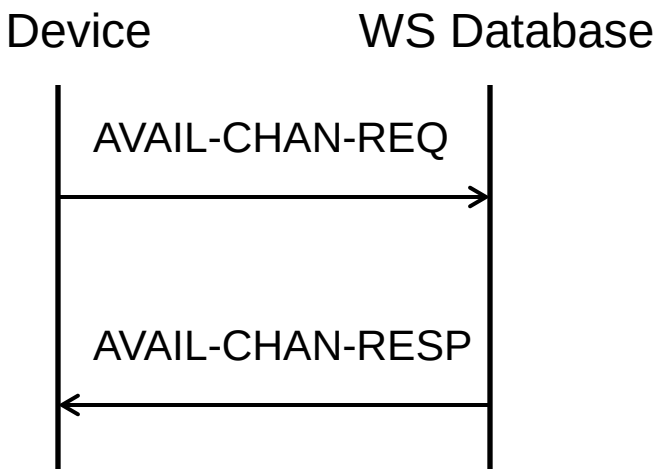
Ver - Protocol version ; Authority - Indicates the regulatory rules that need to be applied to the device ; Device Type - Type of devices , for example, in US FCC rules this is referred to as Fixed or Mode II device ;
Device Identity - Information that identifies the class of device (e.g., FCC ID in case of US, Manufacturer Serial number, and so on);
Device Location - Location information of the device, for example, Geo-location, information about lat, long, antenna height and so on (location encoding of location is TBD)
Device Owner - Owner of the device ; Message Authentication Code - Code that authenticates the ownership of the message

REG-RESP Message Format

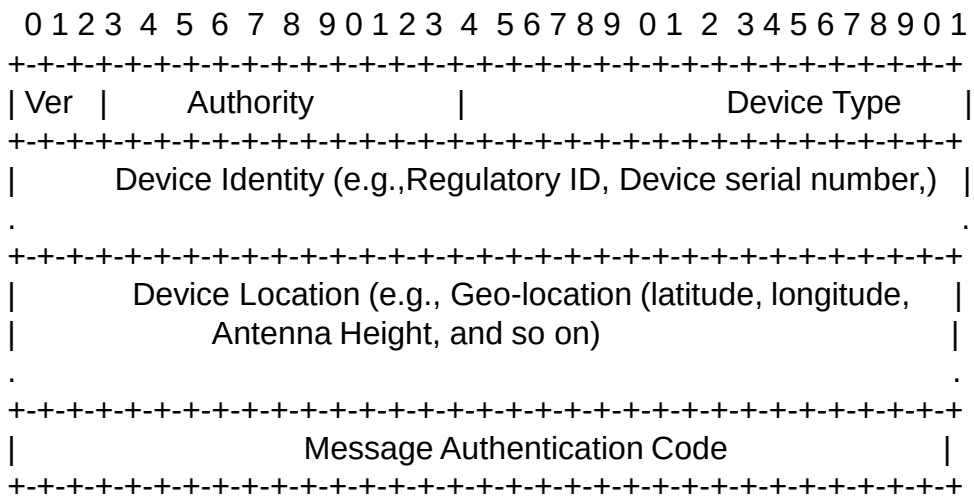
Ver - Protocol version
Authority - Indicates the regulatory rules that need to be applied to the device Operator
Sequence no - Represents the message sequence
Result Code - Success or failure of device registration
Message Authentication Code - Code that authenticates the ownership of the message

Querying the Database

•To obtain the available channel and other associated parameters, the device needs to query the database



AVAIL-CHAN-REQ Message Format



Ver - Protocol version ;

Authority - Indicates the regulatory rules that need to be applied to the device

Device Type - Type of devices , for example, in US FCC rules this is referred to as Fixed or Mode II device

Device Identity - Information that identifies the class of device (e.g., FCC ID in case of US, Manufacturer Serial number, and so on)

Device Location - Location information of the device for example, Geo-location, information about lat, long, antenna height and so on (location encoding of location is TBD)

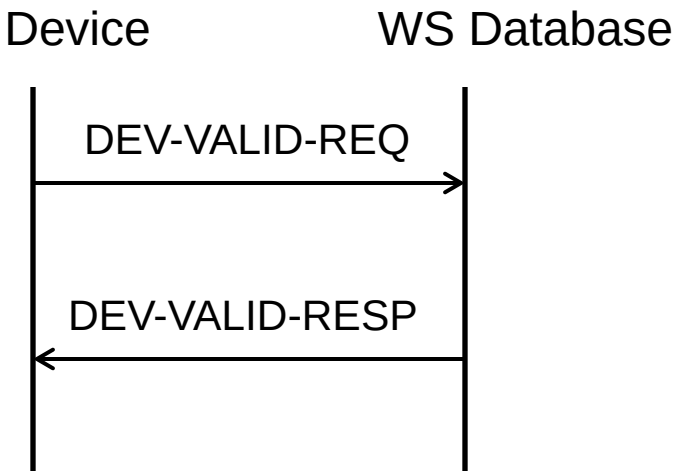
Message Authentication Code - Code that authenticates the owner of the Message

AVAIL-CHAN-RESP Message Format

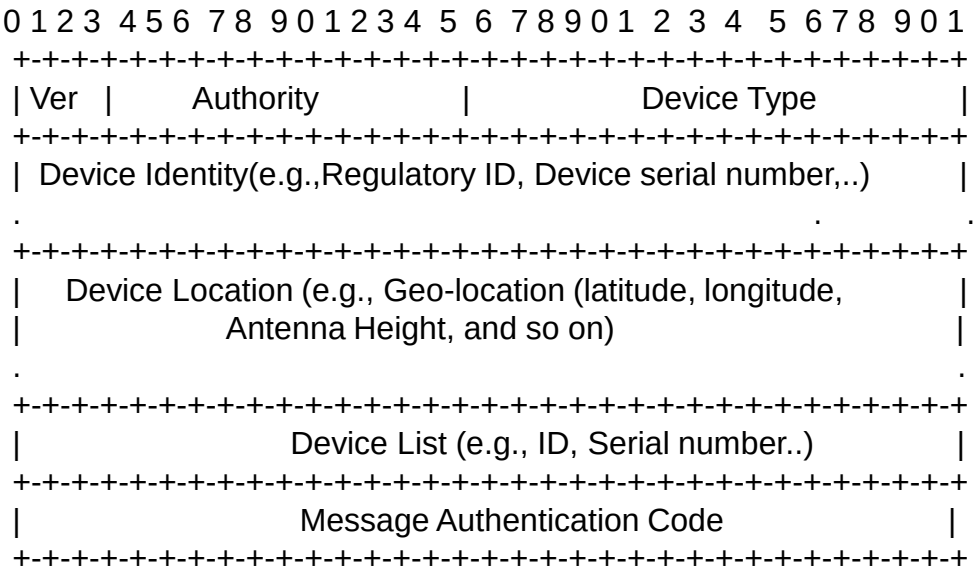
Ver - Protocol version
Authority - Indicates the regulatory rules that need to be applied to the device
Result Code - Success or failure of device registration
Sequence number - Represents the message sequence
Available Channel(s) - An array or set of channels within the scope of the request and regulatory authority where the returned elements contain for ,example, the channel frequency range, availability indicator, operating power, event , and so on.
Message Authentication Code - Code that authenticates the ownership of the message

Device Validation

- Device validation is the process by which devices can be validated by the database



DEV-VALID-REQ Message Format



Ver - Protocol version

Authority - Indicates the regulatory rules that need to be applied m to the device

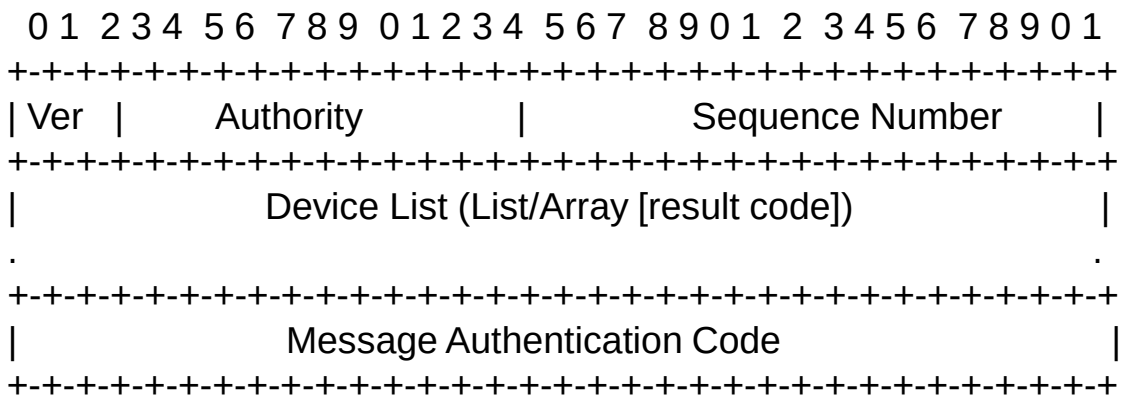
Device Type - Type of devices , for example, in US FCC rules this is referred to as Fixed and Mode II device

Device Identity - Information that identifies the class of device (e.g., FCC ID in case of US, Manufacturer Serial number, and so on)

Device Location - Location information of the device for example, Geo-location, information about lat, long, antenna height and so on (location encoding of location is TBD)

Device List - List of one or more devices that needs the validation with ID, manufacturer serial number and so on..

DEV-VALID-RESP Message Format



Ver - Protocol version
Authority - Indicates the regulatory rules that need to be applied to the device
Sequence number - Represents the message sequence
Device list - List/Array of devices with success or failure
Message Authentication Code - Code that authenticates the ownership of the message

Encoding Considerations

- The examples above suggest the message structure will have bit-oriented fields, similar to the definition of TCP headers

- Other encodings, for example, XML or JSON to encode the same fields discussed in this document should be discussed and allowed

Security Considerations

- Following security requirements should be satisfied:
  - Mutual Authentication
  - Message Integrity
  - Confidentiality (optional)
  - Replay protection
  - ……

Questions? Feedback?