

# Example of JSON-RPC Encoded PAWS Message in Compliance with ICASA-TVWS-2018 Ruleset

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## Document Information

### CHANGE HISTORY

- Version 0.1* First draft
- Version 0.2* Corrections of incorrect requests
- Version 0.3* Corrections of incorrect response messages

**NOTE:** *The latest version of this document supersedes any previous version and its contents; hence it is always required to refer or use the latest.*

**NOTE:** *The “apiKey” parameter may be required by specific S-GLSD providers as a means of enforcing authentication mechanism. ICASA-TVWS-2018 Ruleset, supports either api-key or bearer-token authentication; whereby the S-GLSD provider implements one of the two.*

## Initialization

The following is an example of JSON-RPC encoding for the initialization request message send by Master WSD and S-GLSD:

```
{
  "jsonrpc": "2.0",
  "id": "example-0001",
  "method": "spectrum.paws.init",
  "params": {
    "type": "INIT_REQ",
    "version": "1.0",
    "deviceDesc": {
      "rulesetIds": [
        "ICASA-TVWS-2018"
      ],
      "serialNumber": "master-device-1",
      "icasaTypeApproval": "TA-XYZW/ABC",
      "icasaDeviceType": "Fixed",
      "icasaDeviceCategory": "Master",
      "etsiEnDeviceEmissionsClass": "2"
    },
    "location": {
      "point": {
        "center": {
          "latitude": -25.237854,
          "longitude": 26.015789
        }
      },
      "confidence": 95
    }
  }
}
```

The corresponding initialization response from the S-GLSD looks as follows:

```
{
  "jsonrpc": "2.0",
  "id": "example-0001",
  "result": {
    "version": "1.0",
    "type": "INIT_RESP",
    "rulesetInfos": [
      {
        "authority": "ZA",
        "rulesetId": "ICASA-TVWS-2018",
        "maxPollingSecs": 21600,
        "maxTotalBwHz": 8000000,
        "maxContiguousBwHz": 8000000,
        "maxLocationChange": 100.0,
        "needsSpectrumReport": true
      }
    ]
  }
}
```

## Registration

An example for registering Master WSD:

```
{
  "jsonrpc": "2.0",
  "id": "example-0002",
  "method": "spectrum.paws.register",
  "params": {
    "type": "REGISTRATION_REQ",
    "version": "1.0",
    "deviceDesc": {
      "serialNumber": "master-device-1",
      "icasaTypeApproval": "TA-XYZW/ABC",
      "icasaDeviceType": "Fixed",
      "icasaDeviceCategory": "Master",
      "etsiEnDeviceEmissionsClass": "2"
    },
    "location": {
      "point": {
        "center": {
          "latitude": -25.237854,
          "longitude": 26.015789
        }
      },
      "confidence": 95
    },
    "antenna": {
      "height": 29.0,
      "heightType": "AGL",
      "polarisation": "HOR",
      "gain": 10.0,
      "dir": 145
    },
    "deviceOwner": {
      "owner": [
        "vcard", [ [ "version", {}, "text", "4.0" ], [ "kind", {}, "text", "org" ], [ "fn", {}, "text", "CSIR" ], [ "adr", { "type": "work" }, "text", [ "Meiring Naude Road", "", "Brummeria", "Pretoria", "0184", "South Africa" ] ], [ "tel", { "type": "work" }, "text", "+27 12 841 3028" ], [ "email", { "type": "work" }, "text", "tvws@csir.co.za" ] ] ],
        "operator": [
          "vcard", [ [ "version", {}, "text", "4.0" ], [ "kind", {}, "text", "org" ], [ "fn", {}, "text", "CSIR" ], [ "adr", { "type": "work" }, "text", [ "Meiring Naude Road", "", "Brummeria", "Pretoria", "0184", "South Africa" ] ], [ "tel", { "type": "work" }, "text", "+27 12 841 3028" ], [ "email", { "type": "work" }, "text", "tvws@csir.co.za" ] ] ]
      ]
    }
  }
}
```

An example of Master when registering a Client WSD:

```
{
  "jsonrpc": "2.0",
  "id": "example-0003",
  "method": "spectrum.paws.register",
  "params": {
    "type": "REGISTRATION_REQ",
    "version": "1.0",
    "deviceDesc": {
      "serialNumber": "client-device-2",
      "icasaTypeApproval": "TA-XYZW/ABC",
      "icasaDeviceType": "Fixed",
      "icasaDeviceCategory": "Client",
      "etsiEnDeviceEmissionsClass": "2"
    },
    "masterDeviceDesc": {
      "serialNumber": "master-device-1"
    }
  }
}
```

```

"location": {
  "point": {
    "center": {
      "latitude": -25.227854,
      "longitude": 26.015780
    }
  },
  "confidence": 95
},
"antenna": {
  "height": 25.0,
  "heightType": "AGL",
  "polarisation": "HOR",
  "gain": 10.0,
  "dir": 211
},
"deviceOwner": {
  "owner": [
    "vcard", [ [ "version", {}, "text", "4.0" ], [ "kind", {}, "text", "org" ], [ "fn", {},
"text", "CSIR" ], [ "adr", { "type": "work" }, "text", [ "Meiring Naude Road", "", "Brummeria", "Pretoria",
"0184", "South Africa" ] ], [ "tel", { "type": "work" }, "text", "+27 12 841 3028" ], [ "email", { "type": "work" },
"text", "tvws@csir.co.za" ] ] ],
  "operator": [
    "vcard", [ [ "version", {}, "text", "4.0" ], [ "kind", {}, "text", "org" ], [ "fn", {}, "text",
"CSIR" ], [ "adr", { "type": "work" }, "text", [ "Meiring Naude Road", "", "Brummeria", "Pretoria", "0184",
"South Africa" ] ], [ "tel", { "type": "work" }, "text", "+27 12 841 3028" ], [ "email", { "type": "work" }, "text",
"tvws@csir.co.za" ] ] ]
  }
}
}

```

For both cases of registration requests above, the corresponding response by S-GLSD looks as follows:

```

{
  "jsonrpc": "2.0",
  "id": "example-0002",
  "result": {
    "version": "1.0",
    "type": "REGISTRATION_RESP",
    "rulesetInfos": [
      {
        "authority": "ZA",
        "rulesetId": "ICASA-TVWS-2018",
        "maxPollingSecs": 1440,
        "maxTotalBwHz": 8000000,
        "maxContiguousBwHz": 8000000,
        "maxLocationChange": 100.0,
        "needsSpectrumReport": true
      }
    ]
  }
}

```

## Available Spectrum Query

An example when a Master WSD is requesting operational parameters (available spectrum) for itself:

```
{
  "jsonrpc": "2.0",
  "id": "example-0004",
  "method": "spectrum.paws.getSpectrum",
  "params": {
    "apiKey": "xxxxx-xxxx-xxxxxx",
    "type": "AVAIL_SPECTRUM_REQ",
    "version": "1.0",
    "deviceDesc": {
      "serialNumber": "master-device-1",
      "icasaTypeApproval": "TA-XYZW/ABC",
      "icasaDeviceType": "Fixed",
      "icasaDeviceCategory": "Master",
      "etsiEnDeviceEmissionsClass": "2"
    },
    "location": {
      "point": {
        "center": {
          "latitude": -25.237854,
          "longitude": 26.015789
        }
      },
      "confidence": 95
    },
    "antenna": {
      "height": 29.0,
      "heightType": "AGL",
      "polarisation": "HOR",
      "gain": 10.0,
      "dir": 145
    }
  }
}
```

An example when a Master WSD is requesting operational parameters (available spectrum) on behalf of an associated client:

```
{
  "jsonrpc": "2.0",
  "id": "example-0004",
  "method": "spectrum.paws.getSpectrum",
  "params": {
    "apiKey": "xxxxx-xxxx-xxxxxx",
    "type": "AVAIL_SPECTRUM_REQ",
    "version": "1.0",
    "deviceDesc": {
      "serialNumber": "client-device-2",
      "icasaTypeApproval": "TA-XYZW/ABC",
      "icasaDeviceType": "Fixed",
      "icasaDeviceCategory": "Client",
      "etsiEnDeviceEmissionsClass": "2"
    },
    "masterDeviceDesc": {
      "serialNumber": "master-device-1"
    },
    "location": {
      "point": {
        "center": {
          "latitude": -25.227854,
          "longitude": 26.015780
        }
      },
      "confidence": 95
    }
  }
}
```

```

    },
    "antenna": {
      "height": 25.0,
      "heightType": "AGL",
      "polarisation": "HOR",
      "gain": 10.0,
      "dir": 211
    }
  }
}

```

For both requests above, the corresponding response for available spectrum query looks as below. The only difference would be device descriptors as per the request:

```

{
  "jsonrpc": "2.0",
  "id": "example-0004",
  "result": {
    "spectrumSpecs": [{
      "needSpectrumReport": true,
      "spectrumSchedules": [{
        "spectra": [{
          "profiles": [
            [
              {
                "hz": 486000000,
                "dbm": 29.24853135600534
              },
              {
                "hz": 494000000,
                "dbm": 29.24853135600534
              },
              {
                "hz": 494000000,
                "dbm": 25.5535434186217
              },
              {
                "hz": 534000000,
                "dbm": 25.5535434186217
              }
            ],
            [
              {
                "hz": 622000000,
                "dbm": 5.992350496927566
              },
              {
                "hz": 630000000,
                "dbm": 5.992350496927566
              }
            ]
          ],
          "resolutionBwHz": 8000000
        }],
        "eventTime": {
          "startTime": "2020-11-28T12:50:34Z",
          "stopTime": "2020-11-29T12:50:34Z"
        }
      }],
      "rulesetInfo": {
        "authority": "ZA",
        "rulesetId": "ICASATVWS-2018",
        "maxPollingSecs": 2880,
        "maxTotalBwHz": 8000000,
        "maxContiguousBwHz": 8000000,
        "maxLocationChange": 100,
        "needsSpectrumReport": true
      }
    },
    "type": "AVAIL_SPECTRUM_RESP",
    "version": "1.0",
    "timestamp": "2020-11-28T12:50:34Z",
    "deviceDesc": {

```

```
    "serialNumber": "client-device-2",  
    "icasaTypeApproval": "TA-XYZW/ABC",  
    "icasaDeviceType": "Fixed",  
    "icasaDeviceCategory": "Client",  
    "etsiEnDeviceEmissionsClass": "2"  
  }  
}
```



## Available Spectrum Batch Query

An example for requesting operational parameters (available spectrum) by master WSD in a batch query:

```
{
  "jsonrpc": "2.0",
  "id": "example-0005",
  "method": "spectrum.paws.getSpectrumBatch",
  "params": {
    "type": "AVAIL_SPECTRUM_BATCH_REQ",
    "version": "1.0",
    "deviceDesc": {
      "serialNumber": "master-device-1",
      "icasaTypeApproval": "TA-XYZW/ABC",
      "icasaDeviceType": "Fixed",
      "icasaDeviceCategory": "Master",
      "etsiEnDeviceEmissionsClass": "2"
    },
    "locations": [{
      "point": {
        "center": {
          "latitude": -25.237854,
          "longitude": 26.015789
        }
      },
      "confidence": 95
    },
    {
      "point": {
        "center": {
          "latitude": -25.227854,
          "longitude": 26.015780
        }
      },
      "confidence": 95
    }
  ],
  "antenna": {
    "height": 29.0,
    "heightType": "AGL",
    "polarisation": "HOR",
    "gain": 10.0,
    "dir": 145
  }
}
```

The corresponding response for a batch query of available spectrum looks as follows:

```
{
  "jsonrpc": "2.0",
  "id": "example-0005",
  "result": {
    "type": "AVAIL_SPECTRUM_BATCH_RESP",
    "version": "1.0",
    "timestamp": "2020-11-28T12:50:34Z",
    "deviceDesc": {
      "serialNumber": "master-device-1",
      "icasaTypeApproval": "TA-XYZW/ABC",
      "icasaDeviceType": "Fixed",
      "icasaDeviceCategory": "Master",
      "etsiEnDeviceEmissionsClass": "2"
    },
    "geoSpectrumSpecs": [{
      "spectrumSpecs": [{
        "needSpectrumReport": true,
        "spectrumSchedules": [{

```

```

    "spectra": [{
      "profiles": [
        [
          {
            "hz": 4.7E8,
            "dbm": 24.36
          },
          {
            "hz": 5.18E8,
            "dbm": 24.36
          }
        ]
      ],
      "resolutionBwHz": 8000000
    }],
    "eventTime": {
      "startTime": "2020-11-28T12:50:34Z",
      "stopTime": "2020-11-28T12:50:34Z"
    }
  },
  "rulesetInfo": {
    "authority": "ZA",
    "rulesetId": "ICASA-TVWS-2018",
    "maxPollingSecs": 21600,
    "maxTotalBwHz": 8000000,
    "maxContiguousBwHz": 8000000,
    "maxLocationChange": 100.0,
    "needsSpectrumReport": true
  }
},
"location": {
  "confidence": 95,
  "point": {
    "center": {
      "latitude": -25.237854,
      "longitude": 26.015789
    }
  }
}
}, {
  "spectrumSpecs": [{
    "needSpectrumReport": true,
    "spectrumSchedules": [{
      "spectra": [{
        "profiles": [
          [
            {
              "hz": 486000000,
              "dbm": 29.24
            },
            {
              "hz": 494000000,
              "dbm": 29.24
            },
            {
              "hz": 494000000,
              "dbm": 25.55
            },
            {
              "hz": 534000000,
              "dbm": 25.55
            }
          ]
        ],
        [
          [
            {
              "hz": 622000000,
              "dbm": 5.99
            },
            {
              "hz": 630000000,
              "dbm": 5.99
            }
          ]
        ]
      ]
    }
  ]
},

```

```
        "resolutionBwHz": 8000000
      },
      "eventTime": {
        "startTime": "2020-11-28T12:50:34Z",
        "stopTime": "2020-11-29T12:50:34Z"
      }
    },
    "rulesetInfo": {
      "authority": "ZA",
      "rulesetId": "ICASATVWS-2018",
      "maxPollingSecs": 21600,
      "maxTotalBwHz": 8000000,
      "maxContiguousBwHz": 8000000,
      "maxLocationChange": 100,
      "needsSpectrumReport": true
    }
  },
  "location": {
    "confidence": 95,
    "point": {
      "center": {
        "latitude": -25.227854,
        "longitude": 26.015780
      }
    }
  }
}
}
```

## Notify Spectrum Use

The following is an example of JSON-RPC encoding for notify spectrum use message send by WSD to S-GLSD:

```
{
  "jsonrpc": "2.0",
  "id": "teting-0006",
  "method": "spectrum.paws.notifySpectrumUse",
  "params": {
    "type": "SPECTRUM_USE_NOTIFY",
    "version": "1.0",
    "deviceDesc": {
      "serialNumber": "master-device-1",
      "icasaTypeApproval": "TA-XYZW/ABC",
      "icasaDeviceType": "Fixed",
      "icasaDeviceCategory": "Master",
      "etsiEnDeviceEmissionsClass": "2"
    },
    "location": {
      "point": {
        "center": {
          "latitude": -25.237854,
          "longitude": 26.015789
        }
      },
      "confidence": 95
    },
    "spectra": [{
      "profiles": [
        {
          "hz": 486000000,
          "dbm": 24.36
        },
        {
          "hz": 494000000,
          "dbm": 24.36
        }
      ]
    },
    "resolutionBwHz": 8000000
  }
}
```

The corresponding notify spectrum use response from the S-GLSD looks as follows:

```
{
  "jsonrpc": "2.0",
  "id": "example-0006",
  "result": {
    "version": "1.0",
    "type": "SPECTRUM_USE_RESP",
    "rulesetInfos": [{
      "authority": "ZA",
      "rulesetId": "ICASA-TVWS-2018",
      "maxPollingSecs": 21600,
      "maxTotalBwHz": 8000000,
      "maxContiguousBwHz": 8000000,
      "maxLocationChange": 100.0,
      "needsSpectrumReport": true
    }
  ]
}
```