

# Computerate Specifying Verified Internet-Drafts

2021-03-20

Marc Petit-Huguenin

# Computerate Specifying

- A Computerate Specification is the combination of a human-readable document format (AsciiDoc) and a dependently typed programming language (Idris2), augmented with the ability to inject the result of computations in that language as the document is processed.
- The tooling produces a verified xml2rfc v3 file from a computerate specification, ready to be submitted as an Internet-Draft.

# Example Specification

```
> t : String
> t = concat (take rc' (map (\t => show t ++ " ms, ")
>   (transmissions 0 rto)))
>   ++ "and " ++ show (transmission rto rc') ++ " ms"
```

For example, assuming an RTO of `code:[rto]ms`, requests would be sent at times `code:[t]`.

If the client has not received a response after `code:[transmission rto (cast (rc - 1)) + rto * rm] ms`, the client will consider the transaction to have timed out.

```
tools computerate -t ietf -x rfc,txt,html,pdf rfc8489.lipkg
```

For example, assuming an RTO of 500 ms, requests would be sent at times 0 ms, 500 ms, 1500 ms, 3500 ms, 7500 ms, 15500 ms, and 31500 ms. If the client has not received a response after 39500 ms, the client will consider the transaction to have timed out.

# Standard Library

- Verifying a specification from scratch is time-consuming, so a standard library is developed to provide embedded DSLs that helps writing specifications that use common constructs in I-Ds:
- Denominate Numbers
- ABNF
- Petri Nets (to generate state machines and message sequence charts).

# ABNF DSL Example

An eDSL is used to describe an ABNF that is verified to be correct when the xml2rfc file is generated:

```
> alpha : Abnf True
> alpha = rule "ALPHA" $ hexRange 0x41 0x5a
>   <|> hexRange 0x61 0x7a
```

```
code::[alpha]
```

- The tooling verifies that the ABNF is correct and automatically format and insert the equivalent text in the document:

```
ALPHA    = %x41-5A / %x61-7A
```

# Links

- Tutorial, standard library reference, tooling installation and usage:

<https://datatracker.ietf.org/doc/draft-petithuguenin-computerate-specifying/>