Testing of a telecommunication protocol using constraint programming

Olga Grinchtein    Mats Carlsson    Justin Pearson

Ericsson AB    SICS    Uppsala University
• The LTE Radio Base Station (RBS) is SUT at our department at Ericsson.
• Our case study is the Public Warning System.
• Test harness should analyze User Equipment protocol logs. Protocol logs are sequences of messages with timestamps.
• We use MiniZinc constraint solving system for protocol log analysis.
• Protocol log analysis includes checks that protocol log contains correct messages with correct timing and content.
• The model consists of constraints on arrays of timestamps and message content
  – Arrays of decision variables of correct timestamps of messages.
  – Arrays of parameters which contain timestamps and content of messages from the log.
  – Boolean decision variables indicate errors in the log

• \((\exists \ 1 \leq i \leq \text{numberSIB11log}) \left( \text{SIB11TimeLog}_i > P\text{agSN}_{\text{numberOfbroadcasts}} \right) \leftrightarrow \text{SIB11afterpagind} = 1\)

• Protocol log analysis is an optimization problem. We minimize sum of Boolean decision variables