Errata for "Towards Virtual Networking for a Time-Triggered Hypervisor" (RTNS 2025)

Jan Ruh Silviu S. Craciunas Jan Korecky

October 13, 2026

This document corrects errors in the formal system model and correctness constraints of the paper "Towards Virtual Networking for a Time-Triggered Hypervisor," published in the *Proceedings of the 33rd International Conference on Real-Time Networks and Systems (RTNS 2025)*. The errors concern the formal statement of the model and constraints. The schedule synthesis implementation used in the experimental evaluation enforced the intended semantics, so the experimental results and the conclusions of the paper are unaffected. Constraints 1–5 and 8–10 of the paper recapitulate constraints of the RTNS 2024 paper "End-to-End Schedulability of Virtualized Distributed Time-Triggered Systems" (DOI: 10.1145/3696355.3696364) and inherit some of the errors corrected in the errata of that paper.

Erratum 1 — Typographical correction, TX/RX task definitions, Section 3.2

Two corrections apply to the definition of the virtual-network backend tasks.

(a) The RX task must be a member of the RX task set, $\tau_{v,i}^{rx} \in \mathcal{RX}^v(\rho_p)$, not of $\mathcal{TX}^v(\rho_p)$ as published (likewise in the quantifier prefix of Constraint 12, cf. Erratum 4).

(b) The period of an RX task must be derived from the received streams, $T_i^v = \mathrm{lcm}\{T_x \mid \forall s_x \in \mathcal{S}_{v,i}^{rx}\}$, not from $\mathcal{S}_{v,i}^{tx}$ as published.

Erratum 2 — Joint unsatisfiability of Constraints 5, 6, and 7, Section 4.2

The first conjunct of Constraint 5 is an alternative to Constraint 6, while its second conjunct is an alternative to Constraint 7. These alternatives must not be applied jointly, but this clarification is missing in the paper. As published, all three constraints are stated over the same universally quantified domain and when applied jointly, they are unsatisfiable. In the implementation, Constraint 6 is only applied if a stream's first link is a virtual link, and Constraint 7 is only applied if a stream's last link is a virtual link. Accordingly, the first or second conjunct of Constraint 5 does not apply in the respective case. The paper therefore needs to include the following clarification after Constraint 7:

> *Constraints 5–7 apply mutually exclusively, depending on the type of a stream's first and last link. If the first link (a, x) of a stream s_h is a virtual link, Constraint 6 applies and the first conjunct of Constraint 5 is omitted. Otherwise, the first conjunct of Constraint 5 applies and Constraint 6 is omitted. Analogously, if the last link (y, b) of s_h is a virtual link, Constraint 7 applies and the second conjunct of Constraint 5 is omitted. Otherwise, the second conjunct of Constraint 5 applies and Constraint 7 is omitted. Hence, for every stream, exactly one of Constraint 5's first conjunct and Constraint 6 holds, and exactly one of Constraint 5's second conjunct and Constraint 7 holds.*

Erratum 3 — Helper set $\mathcal{R}^v_{ijk}$, Section 4.4

Three corrections apply to the helper set for the TX/RX task job segment size constraints.

(a) The job-instance mapping is computed as $j = \lfloor (g \cdot T_f)/T_i^v \rfloor$ using the TX/RX task period T_i^v, but the two containment inequalities add the instance offset as $j \cdot T_i$, where i is a queue index and T_i is undefined. Both occurrences must read $j \cdot T_i^v$.

(b) The published segment-internal reservation

$$\delta(x^v_{ijk}) = \begin{cases} \delta^{tx}, & \text{if } x^v_{ijk} \text{ is a TX task job segment} \\ -\delta^{rx}, & \text{if } x^v_{ijk} \text{ is a RX task job segment} \end{cases}$$

carries a sign error: with $-\delta^{rx}$, the upper containment bound $f_{fgh}.\phi + f_{fgh}.L + g \cdot T_f \leq x_{ijk}.\phi + x_{ijk}.L - \delta(x^v_{ijk}) + j \cdot T_i^v$ permits frames of an RX segment to complete δ^{rx} *after* the segment ends, contradicting Constraint 12, which reserves δ^{rx} per stream job *inside* the segment. The definition must read $\delta(x^v_{ijk}) = \delta^{rx}$ for RX task job segments.

(c) The helper set is defined only for TT TX tasks. The definition for TT RX tasks is analogous. We can write:

$$\begin{aligned} \mathcal{R}^{v,x}_{ijk} := \{ J^x_{fg} | \forall s_f \in \mathcal{S}^x_{v,i}, \forall J^x_{fg} \in \mathcal{J}^x_{v,i}, \forall f_{fgh} \in \mathcal{F}^x_{fg} : \\ j = \left\lfloor \frac{g \cdot T_f}{T_i^v} \right\rfloor \wedge (f_{fgh}.\phi + g \cdot T_f \geq x_{ijk}.\phi + j \cdot T_i^v) \\ \wedge (f_{fgh}.\phi + f_{fgh}.L + g \cdot T_f \leq x_{ijk}.\phi + x_{ijk}.L - \delta(x^v_{ijk}) + j \cdot T_i^v) \} \end{aligned}$$

with $x \in \{tx, rx\}$.

Erratum 4 — Constraints 11 and 12 (TX/RX Task Job Segment Size), Section 4.4

There are some typos and spurious variables that can be removed, hence the corrected constraints read:

Constraint 11 (TX Task Job Segment Size Constraint)**.**

$$\begin{aligned} &\forall n \in \mathcal{V}, \forall v \in \mathcal{V}^n, \forall c \in \mathcal{C}^n, \forall \rho_p \in \mathcal{P}(c), \forall \tau^{tx}_{v,i} \in \mathcal{TX}^v(\rho_p), \forall J^{tx}_{ij} \in \mathcal{J}^{tx}_i, \forall x^v_{ijk} \in \mathcal{X}^{tx}_{ij} : \\ &x^v_{ijk}.L \geq \delta_\tau(\rho_p) + \sum_{\forall J^{tx}_{fg} \in \mathcal{R}^{v,tx}_{ijk}} \left(\delta^{tx} + \sum_{\forall f_{fgh} \in \mathcal{F}^{tx}_{fg}} f_{fgh}.L \right) \end{aligned}$$

Constraint 12 (RX Task Job Segment Size Constraint)**.**

$$\begin{aligned} &\forall n \in \mathcal{V}, \forall v \in \mathcal{V}^n, \forall c \in \mathcal{C}^n, \forall \rho_p \in \mathcal{P}(c), \forall \tau^{rx}_{v,i} \in \mathcal{RX}^v(\rho_p), \forall J^{rx}_{ij} \in \mathcal{J}^{rx}_i, \forall x^v_{ijk} \in \mathcal{X}^{rx}_{ij} : \\ &x^v_{ijk}.L \geq \delta_\tau(\rho_p) + \sum_{\forall J^{rx}_{fg} \in \mathcal{R}^{v,rx}_{ijk}} \left(\delta^{rx} + \sum_{\forall f_{fgh} \in \mathcal{F}^{rx}_{fg}} f_{fgh}.L \right) \end{aligned}$$

Erratum 5 — Typographical correction, Section 4.2

In the paragraph preceding Constraint 5, "Furthermore, he transmission schedule of the stream s_k aligns along its route" must read "Furthermore, the transmission schedule of the stream s_h aligns along its route" (the constraint binds s_h).