***Stabilizing Transmissions and Delays in Nonlinear Networked Control Systems: Hybrid Systems with Memory and Lyapunov Approach***

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**Abstract:** We employ the hybrid-systems-with-memory formalism to investigate transmission intervals and delays that provably stabilize Networked Control Systems (NCSs). Nonlinear time-varying plants and controllers with variable discrete and distributed input, output and state delays along with nonconstant discrete and distributed network delays are considered. Nominal system L2-stability, Uniformly Globally Exponentially Stable (UGES) scheduling protocols and upper bounds of network-induced output error dynamics are brought together to infer Uniform Global pre-Asymptotic Stability (UGpAS) of the closed-loop system via Lyapunov-Krasovskii arguments. In other words, we supplant the Lyapunov-Razumikhin conditions and trajectory-based small-gain theorem with linear L2-gains arguments featured in our previous works by Lyapunov-Krasovskii functionals to prove UGpAS of interconnected hybrid systems with memory. The selected methodology allows for more general delays (e.g., input/output/state discrete and distributed delays) and output error dynamics (e.g., multiple discrete and distributed delays) as well as less conservative estimates of Maximally Allowable Transfer Intervals (MATIs). Our results are applicable to control problems with output feedback and the so-called large delays. In addition, model-based estimators between two consecutive transmissions, rather than merely Zero-Order Hold (ZOH) strategy, are allowed for in order to prolong MATIs. Lastly, a numerical example involving an observer-predictor-based Linear Time-Invariant (LTI) control system is provided.