Université de Rennes

Direction de la Recherche et de l'Innovation

Appel à projets - Année 2025

Contrats doctoraux «Ordinaires»

ECOLE DOCTORALE : MATISSE **POLE DE RECHERCHE : AST**

Unité de recherche d'accueil

Unité de Recherche : IRISA

Equipe : COMPACT

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Sujet

Titre : Limits for the global video consumption

Mots clés : Video transmission, environmental impact, life cycle assessment

Cotutelle internationale (oui/non) : non **Si oui, préciser l'établissement et le pays de rattachement** :

Descriptif (15-30 lignes) :

Context : Video consumption takes a significant part among the greenhouse gas emissions due to ICT. The most significant part of environmental impact comes from the terminal manufacturing and its consumption during the video display according to current studies. And this quantity explodes: video traffic is estimated to grow by 79% between 2021 and 2027. This trend is unsustainable, and solutions must be found to reduce the environmental impact of the video ecosystem.

Hypotheses and research questions: Working towards a responsible and resilient digital future naturally means questioning a priori the relevance of any rising technology. But what about existing technologies? Trying to make them less energy-intensive proves insufficient, because of the rebound effect this implies. So we need to define limits for their use. In this project, we will explore the conditions for setting such limits, particularly in the case of video streams (which account for a significant proportion of CO2 emissions from the digital world). More specifically, we will study the levers (technical, regulatory, legislative, etc.) that can be put in place, as well as their effectiveness and acceptance by citizens. This inter-disciplinary question will be addressed in close collaboration with researchers in the Human and Social Sciences.

Detailed tasks and methodology:

- model the energy spent over the whole video processing chain during different delivery scenarios, based on the state-of-the art analysis and experimental measurement campain.
- identify the high-energetic parts in this pipeline and some related levers that could be put in place to reduce their costs, based on a simulation tool for a « what-if » analysis.
- discuss with the Human and Social Siences researchers for setting the foundations of experimentations and inter-discplinary research directions, based on regular meetings and workshops with the active regional community.

Bibliography:

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- H. Ferreboeuf, F. Berthoud, P. Bihouix, P. Fabre, D. Kaplan, L. Lefèvre et al., *Lean ICT-towards digital sobriety*, Report for the Think Tank The Shift Project, vol. 6, 2019.
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- G. Guennebaud, A. Bugeau, and A. Dudouit, "Assessing VoD pressure on network power consumption," arXiv preprint arXiv:2304.03151, 2023.