1. TRES GRANDS RESEAUX ET SYSTEMES

VM Scheduling for Capacity Planning in Distributed Clouds

Parties prenantes

INSTITUT Mines-Télécom

MINES Nantes

UNIVERSITÉ DE NANTES

lina

Contact

Jonathan Pastor, Mines Nantes,
Ascola research team,
Département Informatique
Mines Nantes

Partenaires

The Discovery Initiative
http://beyondtheclouds.github.io

I- Background

- Cloud computing providers (Amazon, Google, Rackspace, …) serve virtual machines (VMs) that are hosted in large data centers.
- ***Capacity Planning:*** optimize ressource usage within a cloud infrastructure.
- ***VM Scheduling:*** Overloaded VMs may be relocalized by a scheduling algorithm on underloaded servers. (one important problem of capacity planning)
- Development of distributed schedulers to scale this size (In particular multi-cluster topology).

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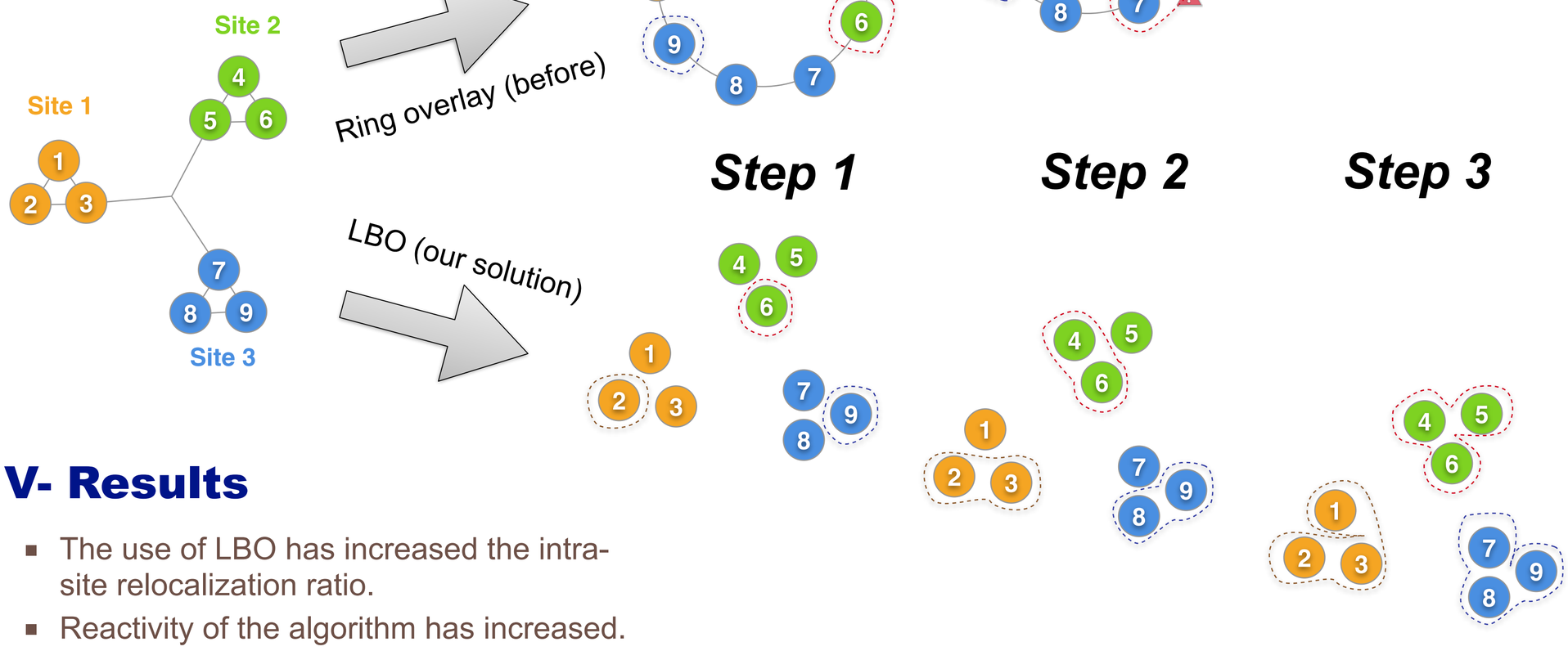
- **Current schedulers do not take into account network parameters (bandwidth, latency, …).**
- **Ineffective collaborations:**
  Inter-site collaborations ⇨ Inter-site relocalizations
- **Need of a "locality aware" VM scheduler.**

III- Objectives

- Introduce "locality properties" into DVMS (Distributed Virtual Machine Scheduler), a scalable VM scheduler, by leveraging a locality-based overlay network (LBO) instead of a ring-based overlay.
- **Maximize intra-site relocalizations and minimize inter-site relocalizations.**

IV- Example

- We take the example of a multisite configuration:
  - 3 geographical sites.
  - Each site is composed of 3 servers (nodes).
- An ISP (Iterative Scheduler Procedure) is started on nodes {2, 6, 9}.
- The example compares the use of 2 overlay networks with DVMS:
  - Ring-based overlay (Chord).
  - Locality-based overlay (Vivaldi).



V- Results

- The use of LBO has increased the intra-site relocalization ratio.
- Reactivity of the algorithm has increased.
- Inter-sites collaborations have become more efficient.

	Chord	LBO
Average	0.496	0.863
Minimum	0.378	0.798
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Table: Comparison of intra-site relocalization ratio.

VI- Towards a Fully Decentralized Cloud: the Discovery Research Initiative

- Efficiency of DVMS improved without modifying its core.
- First glimpse of the promising future of using locality properties to improve massively distributed clouds.
- This work will be included in the massively distributed cloud system developed by the ***Discovery initiative***.
- **First step toward a highly distributed cloud infrastructure that takes into account locality properties.**

Colloque Institut Mines-Télécom "Numérique : Grande échelle et complexité
Mars 2014

Vers un Nuage responsable et sécurisé

Parties prenantes

MINES Nantes

lina

UNIVERSITÉ DE NANTES

Contact

Ronan-Alexandre Cherrueau,
Mario Südholt
ASCOLA Research group
Mines Nantes

http://www.emn.fr/z-info/ascola

Partenaires

Projet Européen **A4Cloud**
(FP7, EC 317550)

The Cloud Accountability Project (A4Cloud) focuses on the Accountability For Cloud and Other Future Internet Services as the most critical prerequisite for effective governance and control of corporate and private data processed by cloud-based IT services.

www.a4cloud.eu

Le Nuage

Informatique en Nuage :
- Réservoir de services
- Très disponible (accès partout/tout le temps)
- Tolérant aux pannes
- Élastique sur les ressources allouées

Données personnelles :
- Quelques protocoles pour gérer les données perso (ex: OAuth 2.0)
- Vos données perso sont sûrement déjà dans le Nuage **!**

Problématique

Assurer les revendications des utilisateurs/fournisseurs sur l'utilisation des données pour un Nuage responable et sécurisé

Exemples :
- Alice autorise le partage de ses photos avec ses amis sur Dropbox
- Dropbox revendique la collection des métadonnées des photos pour améliorer leur recherche

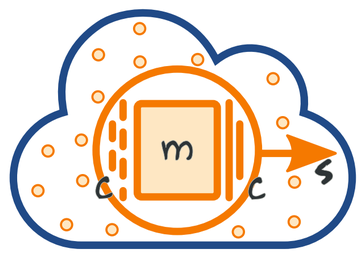
Responsabiliser le Nuage

- Requêter le Nuage pour tester si une revendication est respectée
- Empêcher la violation d'une revendication sur le Nuage

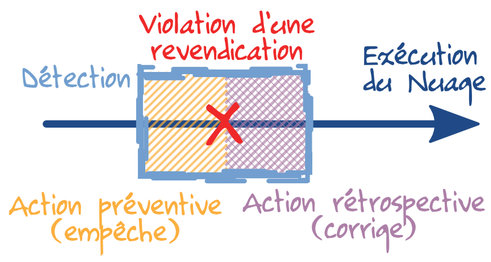
Méthode

Langage de point de coupure :
- Séquence sur l'historique d'exécution du Nuage
- Décrit la violation d'une revendication

Langage d'action :
- Modifie dynamiquement les services
- Empêche et/ou corrige la violation d'une revendication



Le langage de point de coupure prend en compte les carctéristiques des services hébergés sur le Nuage. Les séquences s'expriment aux niveaux chorégraphie (s), implémentation (m) et intercepteur (c)



En fonction du temps de la détection d'une violation, le langage d'action permet d'appliquer des actions préventives ou rétrospectives

Exemple

Revendication : OAuth Provider (OP) revendique la protection de l'identité de ses utilisateurs lors d'une authentification unique

Requête : Est-ce que le "state" est présent lors de l'authentification ?

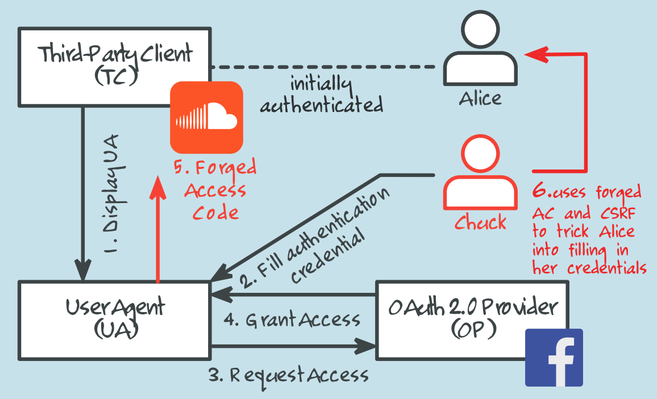
Action: Interdire l'authentification

```
pscheme AuthzExistsState? {

  // Request the Cloud:
  pscope CheckParamNotExists:
    displayUA(args, K)s ;
    [reqAcc(args, K')s &
      !exists("state", args)]
      @StateNotExists ;
    -s,c,m; K'(code, args')s ;
    K(code, args')s

  // Defines actions:
  action after StateNotExist { ... }

}
```



OAuth 2.0

- Délégue l'accès des données perso à une application tièrce
- Très largement utilisé par les acteurs du web (Facebook, Google, Reddit ...)
- Failles de sécurité dans les implementations

Conclusion & Perspectives

- Langage de détection et de correction pour appliquer des politiques sur le Nuage
- Responsabiliser et sécuriser le Nuage
- Avoir une biliothèque abstraite de solutions pour appliquer des politiques sur les données perso

Colloque Institut MInes-Télécom "Numérique : Grande échelle et complexité
Mars 2014

Synthèse de traces réelles de centres de données virtualisés

Parties prenantes

MINES Nantes

EasyVirt

Auteurs

Frédéric DUMONT
frederic.dumont@mines-nantes.fr

Jean-Marc MENAUD
menaud@mines-nantes.fr

Partenaires

FONDATION TELECOM

INSTITUT CARNOT Télécom & Société numérique

1- CONTEXTE

De par sa flexibilité, le **Cloud Computing** s'est imposé comme un nouveau modèle technique et économique au sein des entreprises. Cependant, l'effet rebond de cette flexibilité et élasticité s'est traduit par l'explosion du nombre d'environnements virtuels à gérer. Il n'est plus rare qu'un administrateur soit amené à administrer un parc de plusieurs centaines voir milliers de machines virtuelles. Sans outil adapté d'aide à la gestion du parc, cette tâche d'administration peut vite se révéler impossible à réaliser.

2- OBJECTIF

Notre objectif est de regrouper par similarité des ensembles de VM puis de déterminer celles ne pouvant être regroupées avec les autres. Cette approche classique d'analyse de données s'appuie sur une technique bien connue : le **Clustering**. Le **Clustering** consiste à regrouper un ensemble de points, caractérisés par plusieurs dimensions, en partitions (ou clusters) de points similaires. La similarité est exprimée par l'utilisation d'une mesure de distance entre les points.

L'algorithme le plus usité, K-MEANS[1], propose de diviser un ensemble de points en k partitions afin d'obtenir une similarité satisfaisante pour l'ensemble des K partitions. Cette approche itérative cherche à déterminer K centroïdes, un point de l'espace définissant le centre d'une partition. Cet algorithme possède plusieurs défauts dont la sensibilité au bruit, défaut bloquant puisque nous cherchons les VM atypiques.

[1]J. McQueen. Some methods for classification and analysis of multivariate observations. In In Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability, page pp. 281–297, 1967.

3- METHODE PROPOSEE

Nous avons développé un algorithme de partitionnement multicritères et multi-ressources insensible aux bruits. La distance utilisée dans notre algorithme est calculée suivant un "taux de ressemblance", paramétrable, permettant de définir les bornes minimales et maximales des intervalles des valeurs statistiques.

4- RESULTATS

La figure1 détaille le partitionnement réalisé par notre approche : un groupe composé d'un nombre important de VM et de plus petits groupes composés de 1 à 3 VMS. Sur la figure2, l'algorithme K-MEANS partitionne en un nombre important de petits groupes, assez homogènes en nombre de VM, finalement peu exploitables dans notre cas.

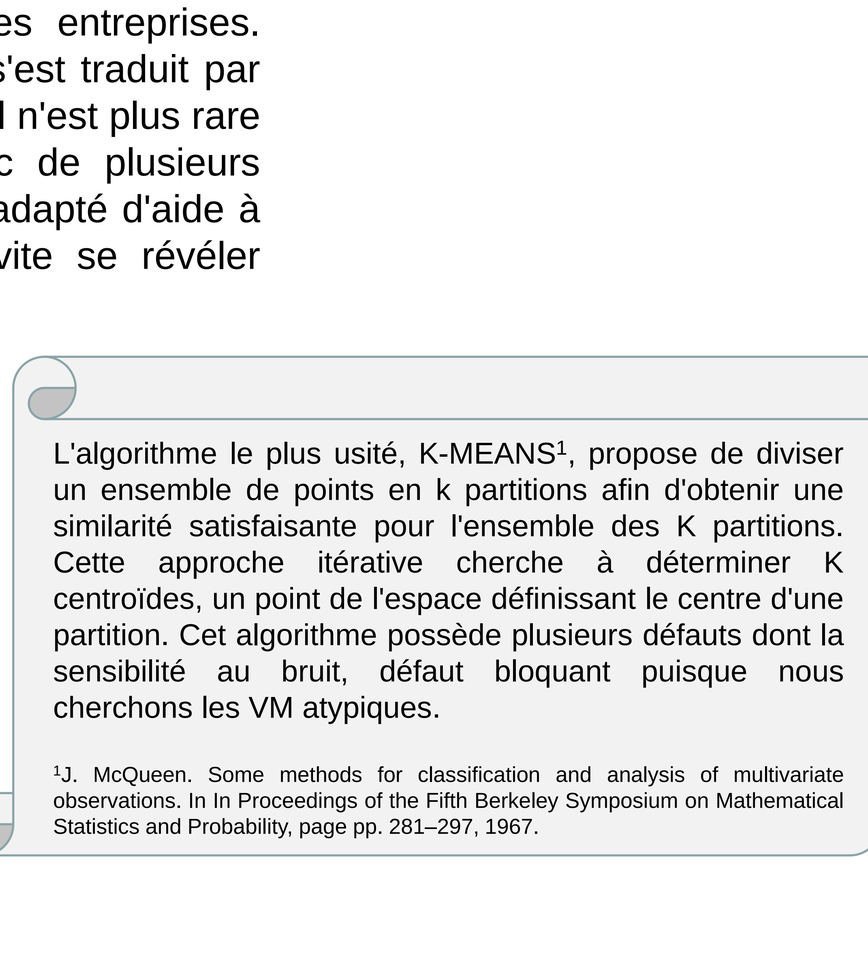


FIGURE 1

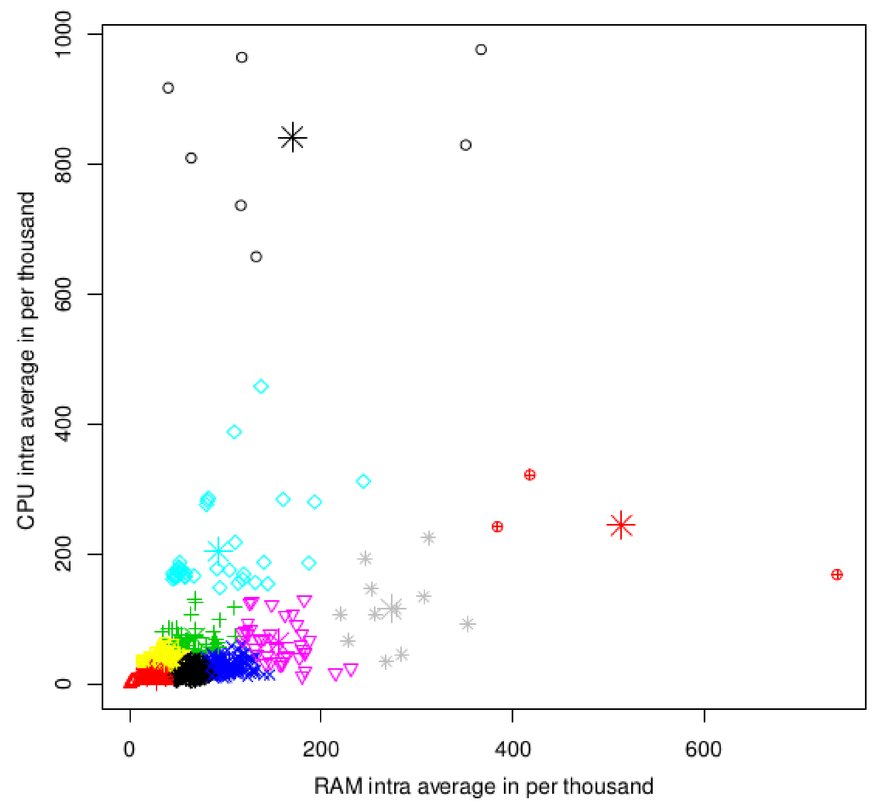


FIGURE 2

5- CONCLUSION

Le **Clustering** est une technique consistant à regrouper par partitions un ensemble de points similaires. La similarité est exprimée par une mesure de distance entre les points. Nous avons étudié les différents concepts du Clustering ainsi que les principaux algorithmes existants. De par leurs limites, aucunes méthodes existantes ne répondent à nos besoins. Nous avons alors développé notre propre algorithme de Clustering, insensible aux bruits, performants, multi-ressources et multicritères.

Colloque Numérique : Grande échelle & Complexité
Mercredi 26 et Jeudi 27 mars 2014

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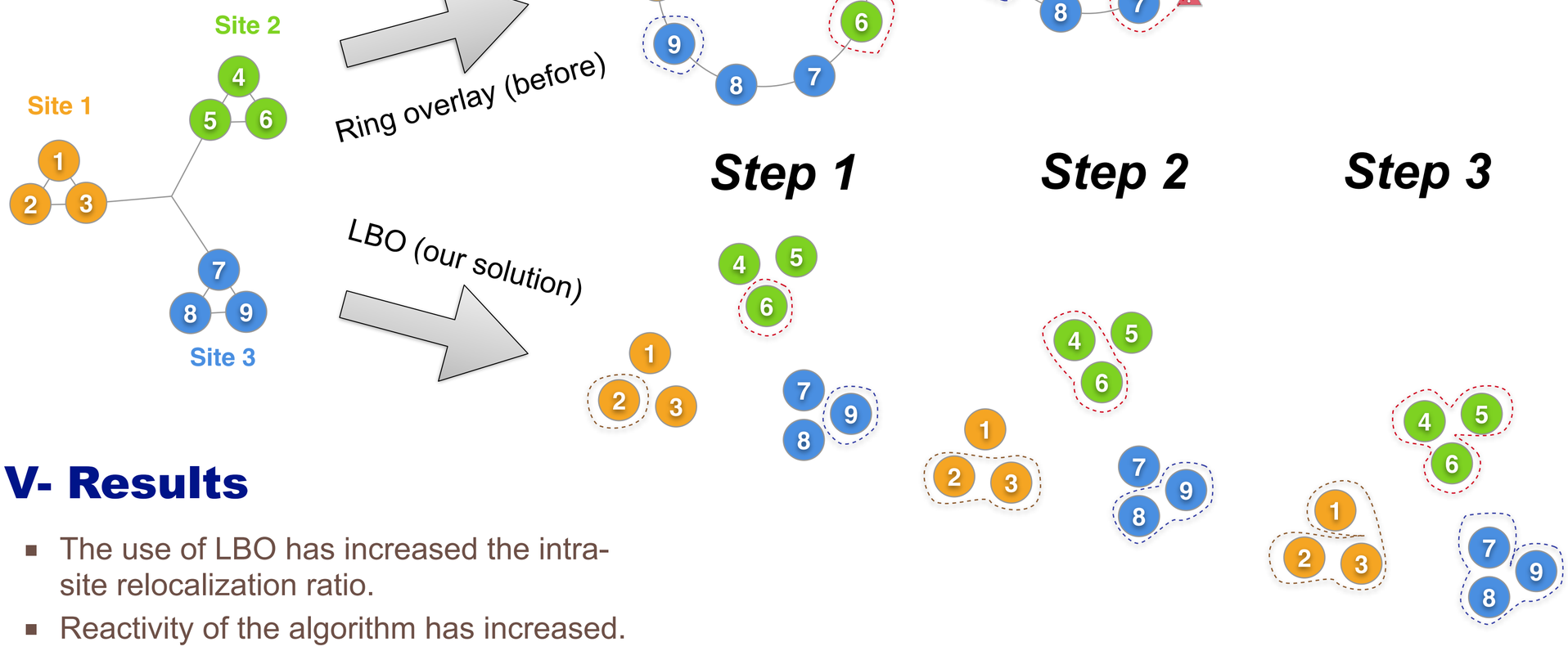

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Mars 2014

Gouvernance Agile de Réseaux d'équipements Machine-to-Machine (M2M)

Parties prenantes

Ecole Nationale Supérieure des Mines SAINT-ETIENNE

Auteurs

Camille Persson(*,**), Gauthier Picard (*), Fano Ramparany (**), Olivier Boissier (*)

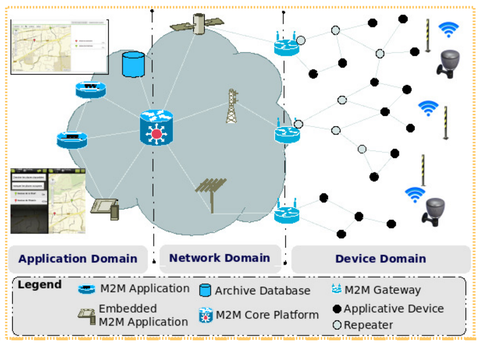
(*) Institut Henri Fayol / ISCOD ENS Mines Saint-Etienne

(**) R&D/TECH/MATIS/COSY Orange Labs Network and Carrier (France Teecom)

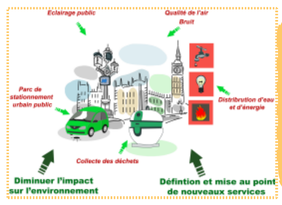
Partenaires

orange™

Contexte



Architecture d'un système M2M. Décomposition en 3 domaines : Application, Réseaux, Appareils



Senscity propose une infrastructure Machine-to-Machine (M2M) mutualisée pour la gestion et le déploiement de services basés sur des réseaux de capteurs et actionneurs interagissant directement avec le monde physique, à l'échelle urbaine (Smart City).

- *Contraintes d'une architecture M2M en mileu urbain*
- Réseaux de ***capteurs*** et ***actionneurs*** (WSAN) ultra-basse consommation et bas débit
- Durée de vie (20 ans sur 1 batterie)
- Large échelle : millions de capteurs, étendue géographique, nombreuses applications, gros volume de données ...

Il est nécessaire de fournir un modèle de gouvernance permettant le passage à l'échelle des infrastructures Machine-to-Machine

Problématique du passage à l'échelle dans le M2M

Définition : Extensibilité (Scalability)

Un système S est extensible sur un ensemble de dimensions D_S, jusqu'à un point fini d_{bound}, par rapport à un ensemble de propriétés $\mathcal{P}_S$, s'il est capable de gérer les changements d'échelles en satisfaisant les spécifications r_{P_i} du systèmes, ou s'il est capable de trouver un compromis $\mathrm{r}_{P_i,bearable}$ entre les propriétés satisfaisant globalement l'ensemble des spécifications.

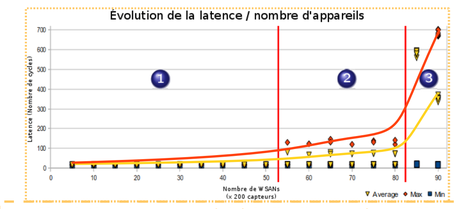
Soit :

$$\exists d_{bound} \in \mathrm{D}_S,\ \forall d \leq d_{bound},\ \forall \mathrm{P}_i \in \mathcal{P}_S \quad (a)$$
$$\exists \mathrm{r}_{P_i,bearable} \in \mathcal{P}_S \times \mathcal{D}_S :: r_{P_i,bearable} = True \quad (b)$$
$$\mathrm{r}_{P_i} = True \iff r_{P_i,bearable} = r_{P_i} \quad (c)$$

- D_S est un tuple $\langle D_0, ..., D_i, ..., D_N \rangle$
- $D_i \in \mathcal{D}_{\mathcal{M}\in\mathcal{M}}$ est défini sur un domaine continu ou discret, ordonné partiellement ou totaltement
  Soit $=_{D_i}, <_{D_i}$ deux fonction d'ordre définies sur $D_i \times D_i$
- r_{P_i} et $\mathrm{r}_{P_i,bearable}$ sont des fonctions d'évaluation des spécifications pour la propriété $P_i \in \mathcal{P}_{\mathcal{M}\in\mathcal{M}}$
  Soit $r_{P_i} : D_S \longrightarrow \{True|False\}$

On regroupe les dimensions du passage à l'échelle et les propriétés des systèmes M2M par catégories : {D1, D2, D3, D4} / {P1, P2, P3}

(D1) Taille du système
- *Nombre d'appareils*
- *Nombre d'utilisateurs*
- *Quantité de données*
- *Nombre de services*
- *Nombre de partenaires*



Simulation de passage à l'échelle d'un système M2M

1 *Fonctionnement normal* 2 *Apparition de problèmes* 3 *Système défaillant*

(D2) Hétérogénéité
- *Types d'appareils*
- *Canaux de communications*
- *Types de données*
- *Technologies de développement*

(P1) Utilisation
- *Latence*
- *Efficacité*
- *Disponibilité*
- *Privacité*
- *Simplicité*

(P2) Performance
- *Efficience*
- *Sûreté*
- *Autonomie*
- *Cohérence*
- *Robustesse*

(P3) Administration
- *Évolutivité*
- *Faisabilité*
- *Maintenabilité*
- *Observabilité*
- *Testabilité*

(D3) Topologie
- *Étendue géographique*
- *Topologie réseaux*
- *Mobilité des services/appareils*
- *Répartition des données*

(D4) Monde physique
- *Durée de vie*
- *Dynamique de l'environnement*
- *Bruits et erreurs*
- *Hostilité du milieu*
- *Comportements émergents*

Complexité de la gestion du passage à l'échelle des systèmes M2M nécessite une approche décentralisée (multi-agent)

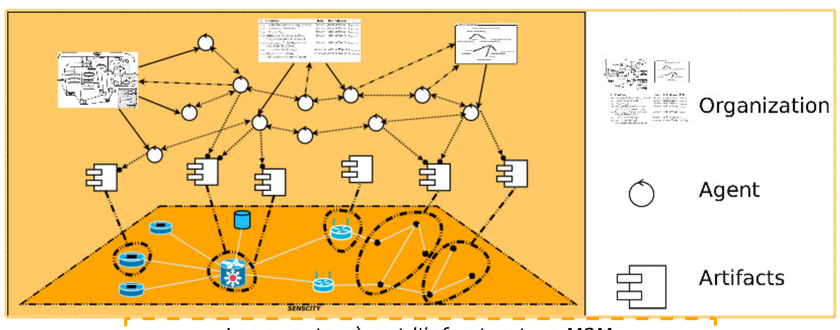
Organisation multi-agent pour la gouvernance du M2M

- ***Système muli-agent centré Organisation pour la gouvernance du M2M :***

Agents *Entités autonomes pro-actives qui gèrent le fonctionnement de l'infrastructure M2M*

Artefacts *Composants de l'architecture M2M manipulables par les agents (eg. modules de la plateforme, capteurs...)*

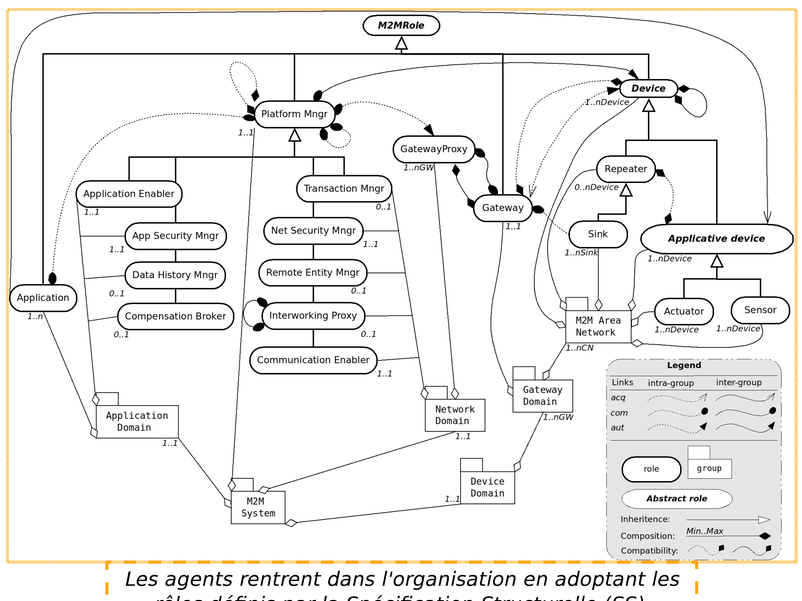
Spécifications Organisationnelles (OS) *Définition de la structure (SS), du fonctionnement (FS) et des règles (NS) de l'organisation basée sur le framework $\mathcal{MOISE}$*
Permet de garantir un fonctionnement global conforme aux spécifications r_{P_i} du système



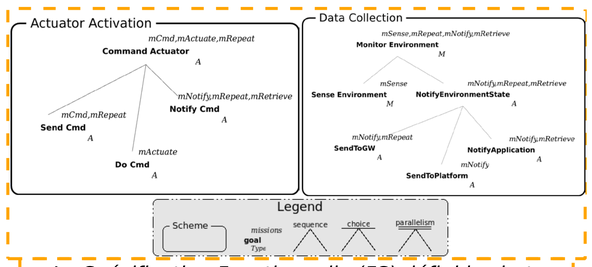
Les agents gèrent l'infrastructure M2M, dont les composants sont représentés par des artefacts.

- ***Gouvernance Agile pour le passage à l'échelle de l'infrastructure M2M :***
  - *Situations non prévues (extension du système)*
  - *Organisation non adaptée aux changement d'échelle (eg. buts non atteignables, délais trop courts...)*
  - *Besoin de redéfinir les Spécifications Organisationnelles*

Les agents peuvent détecter localement les situations nécessitant une réorganisation et proposer des solutions locales pour permettre un meilleur fonctionnement du système



Les agents rentrent dans l'organisation en adoptant les rôles définis par la Spécification Structurelle (SS).



La Spécification Fonctionnelle (FS) défini les buts du système, regroupés dans des missions, ainsi que les plans permettant d'atteindre ces objectifs.

Id	Condition	Role	Rel.	Mission	TTF
n_{01}	$scheduled(sensing\_time)$	Sensor	perm	$mSense$	t_{sense}
n_{02}	$occurred(event)$	Sensor	perm	$mSense$	t_{sense}
n_{03}	$n_{01} \vee n_{02}$	Sensor	obl	$mSense$	t_{sense}
n_{04}	$changed(sensed\_value) \wedge is\_critical(situation)$	Sensor	obl	$mNotify$	t_{send}
n_{05}	$t_{last\_msg} \geq msg\_period \vee is\_full(buffer)$	Sensor	obl	$mNotify$	t_{send}
n_{06}	$on\_receive(msg)$	Repeater	obl	$mRepeat$	t_{repeat}
n_{07}	$on\_receive(msg) \wedge is\_authenticated(msg)$	Gateway	perm	$mNotify$	t_{notify}

Les normes (NS) associent les missions aux rôles et définissent les conditions pour remplir ces missions.

Différents niveaux de réorganisation :

Structurelle	***Fonctionnelle***	***Normative***
Cardinalités des rôles	Supprimer des buts non atteignables ou trop couteux	Renforcer/relacher les relations déontiques
Nouveaux rôles	Redéfinition des plans de buts	Redéfinition des conditions
Compatibilité des rôles	Cardinalité des missions	Redéfinition des TTFs
Renforcement des communications	Redéfinition des TTFs	

Conclusion

- **Contribution :**
  - ***Analyse du passage à l'échelle dans le M2M***
  - ***Modèle de gouvernance de systèmes M2M basé sur une organisation Multi-Agents***
- **Travaux futurs :**
  - ***Définir les comportements de réorganisation des agents : quand ? qui ? quoi ? pourquoi ?***
  - ***Garantir la cohérence des réorganisations***
  - ***Déploiement/test sur l'infrastructure SensCity***

Numérique : Grande échelle et complexité

26 et 27 mars 2014

Contact Camille.Persson@emse.fr

Site web www.emse.fr

Système de recommandation de lieux basé sur l'intention, le contexte et le réseau social

Parties prenantes

Lab-STICC

TELECOM Bretagne

Auteurs

Romain PICOT-CLEMENTE

Cécile BOTHOREL

Philippe LENCA

Lab-STICC CNRS, UMR 6285, Télécom Bretagne

Partenaires

FONDATION TELECOM

INSTITUT CARNOT Télécom & Société numérique

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CREM

ENSICAEN ÉCOLE NATIONALE SUPÉRIEURE D'INGÉNIEURS DE CAEN & CENTRE DE RECHERCHE

DIGITAL AIRWAYS USER INTERFACE SOLUTIONS

SYSNAV Navigation Solutions

MONEXT

aqoba

OBJECTIF

- Recommandation de lieux à un utilisateur en condition de mobilité selon :
  - son intention de visite : visite découverte, visite efficace
  - son contexte : session de visites passées + position géographique courante
  - son réseau social : les visites de ses amis

PROPOSITION

Construction d'un modèle de règles d'association (hors-ligne)

- Extraction de règles d'association par algorithme FP-Growth à partir des sessions de visites de tous les utilisateurs, de la forme : $Règle\ R : A \rightarrow B$ (Conséquent / Antécédent)

  Exemple de règle : « un utilisateur qui visite la Tour Eiffel et l'Arc de Triomphe visite le Louvre »

Processus de recommandations pour un utilisateur (temps-réel)

- Sélection des règles d'association dont $A \subset (session\ courante\ de\ visite)$
- Classement des règles $R: A \rightarrow B$ selon une mesure de pertinence M_p

$$M_p(R) = M_g(R)\left(\alpha M_i(R) + (1-\alpha)\, M_s(R)\right)$$

Mesure géographique / Mesure d'intérêt basée sur l'intention / Mesure sociale

$M_i(R: A \rightarrow B) = confiance(R: A \rightarrow B) = \frac{P(AB)}{P(A)}$,
si intention = efficacité

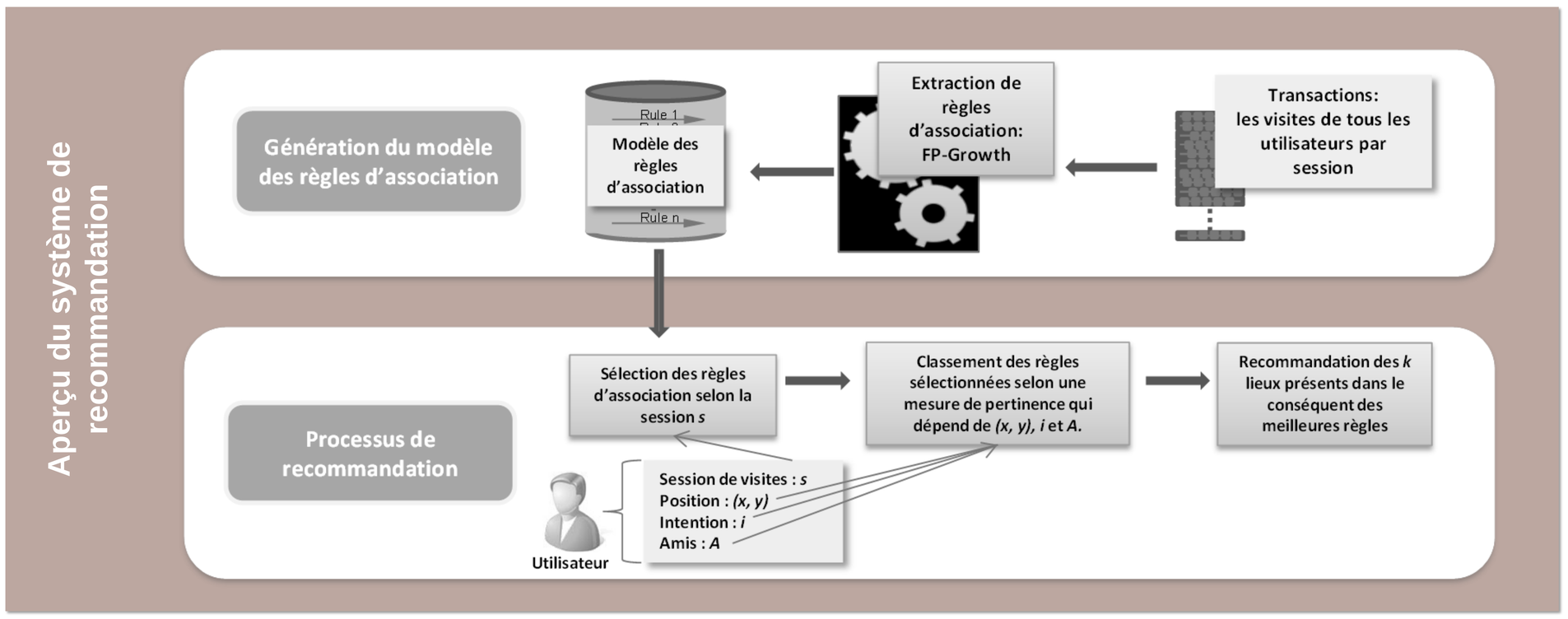
$M_i(R: A \rightarrow B) = surprise(R: A \rightarrow B) = \frac{P(AB)-P(A\bar{B})}{P(B)}$,
si intention = découverte

$M_g(R: A \rightarrow B) = \alpha.distance(B, utilisateur)^{\beta}$

$M_s(R: A \rightarrow B) = confiance_{amis}(R: A \rightarrow B)$

- Recommandation des k lieux conséquents des k meilleures règles

APERCU DU SYSTÈME DE RECOMMANDATION



APPLICATION SUR DONNEES REELLES

Recommandation de magasins, tests de montée en charge

PAY2YOU PLACES

- Données très volumineuses de paiement d'utilisateurs dans des magasins sur 1 année : cluster Hadoop de 80 machines, 1 million de transactions, 40 minutes pour la phase de génération du modèle de règles
- Algorithme FP-Growth Map-Reduce -> point d'étranglement, une étape utilise un reducer unique (construction de l'arbre)
- Expérimentation et évaluation des recommandations sur des utilisateurs réels à venir

hadoop

APACHE HBASE

Références complémentaires

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CHALMERS Sean, BOTHOREL Cécile, PICOT-CLEMENTE Romain**. Big Data - State of the Art.** Rapport technique sur les techniques et plateformes Big Data avec des recommandations sur le choix en fonction des besoins. Lien : http://portail.telecom-bretagne.eu/publi/public/fic_download.jsp?id=21241

Contact romain.picotclemente@telecom-bretagne.eu Site web www.telecom-bretagne.eu

Future Internet: Enabling Inter-Domain Path Diversity

Funded by ETICS, Seventh Framework Programme

Auteurs

Xavier Misseri,

Jean-Louis Rougier

Network and Computer Science Department,

Telecom ParisTech

Collaboration avec:

Damien Saucez,

INRIA, Sophia Antipolis

Ivan Gojmerac

FTW, Wien (Austria)

Helia Pouyllau,

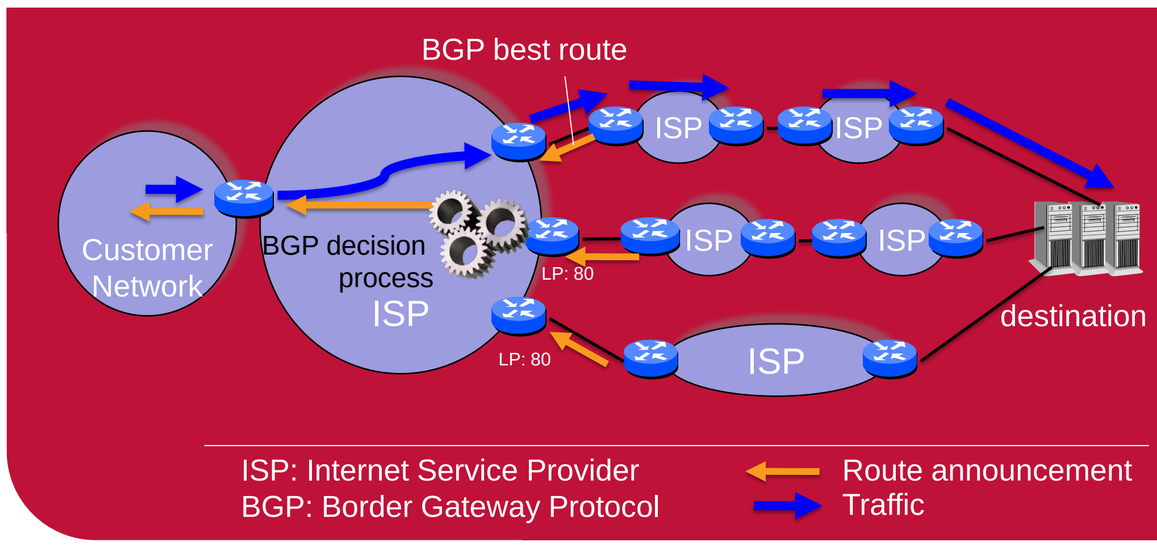
Lamine Lamali

Alcatel Lucent Bell Labs

Current Internet limitation

One single route to destination

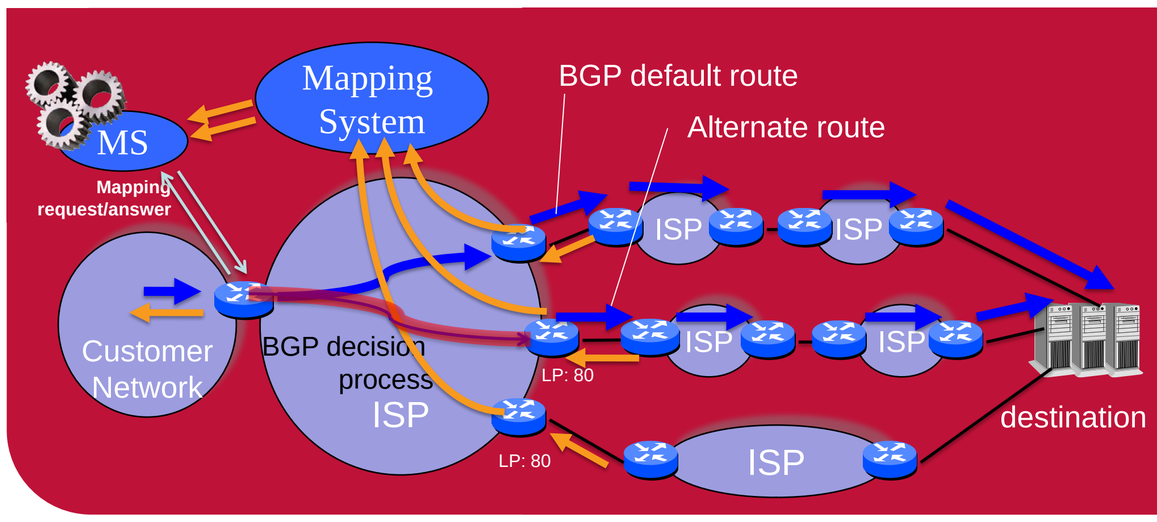
- **Reason:** BGP (current routing protocol) selects one route to any destination, based on a rigid « decision process »
  - Local Preferences,
  - Path length
- **Consequence:** « One fits all » model in contrast with variety of applications (e.g. data, streaming) and customers (eyeballs, content providers, …)
- **Fact:** Huge Potential Internet Diversity (7 routes available in average for Tier 1 providers)



Proposed Incremental Architecture

Step 1: Customer-Provider

- **Proposal:** Select the exit domain to benefit from path diversity
  - Path enforcement via encapsulation (bypass BGP default route)
  - Path diversity management via a Mapping System
  - IETF LISP architecture can be used to implement our scheme [1]



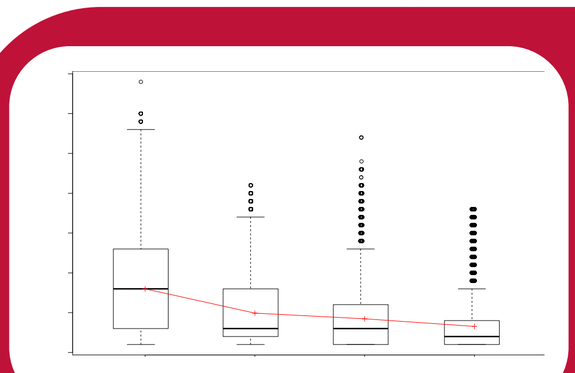
Step 2: Provider-Provider

- **Proposal:** Interconnection of Mapping Systems for propagation of diverse paths
- **Issue:** Global Internet Routing Stability insured with well-known Rules (Gao & Rexford). Risk: This rules are no longer valid when considering path diversity.
- **Contribution:** Simple and Generic Stability rules for path diversity routing [2]. More flexible rules (more flexibility allowed in the choice of routes).
- Approach is scalable [3] and incremental: One ISP starts to benefit from path diversity without any cooperation with other ISPs (Step 1). Diversity then further increase with Mapping interconnections (Step 2)

Results (Evaluation on Internet topology)

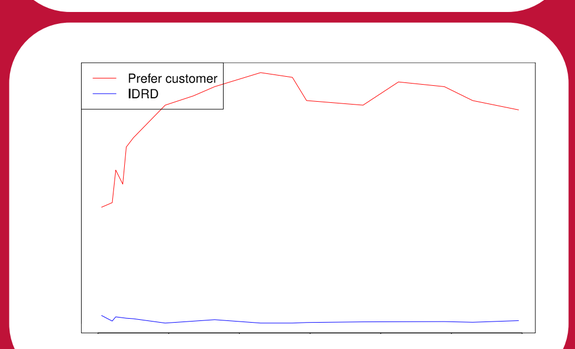
Route Diversity: a Key Feature for Traffic Engineering

- Robustness. Possibility to use disjoint routes (fast path switching, without waiting for global routing re-convergence)
- Flexibility. Allows ISP to announce the “best” routes to its customers, based on specific customer needs and/or flow requirements [4].



Step1: Distribution of Route Diversity for a Tier 1 Network,
based on different route filtering: All, cheapest route only (Local Pref), “shortest path” only (AS Path Length), both LP+AS

(CAIDA & Route Views databases)



Step2: Probability that no alternative disjoint route is available
In the the current Internet (red), with proposed scheme and relaxed stability conditions (blue).

(CAIDA database)

Some References:

[1] X. Misseri, J.-L. Rougier, and D. Saucez, “Internet routing diversity for stub networks with a Map-and-Encap scheme,” in IEEE International Conference on Communications (ICC), 2012

[2] X. Misseri, I. Gojmerac, and J. L. Rougier, “IDRD: Enabling Inter-Domain Route Diversity,” in IEEE International Conference on Communications (ICC), 2013

[3] X. Misseri, I. Gojmerac, and J. Rougier, “Internet-wide multipath: a scalability analysis of path identification schemes,” in Network Of the Future (NOF), 2012

[4] H.Pouyllau, M.L.Lamali, X.Misseri, J.L.Rougier, “Method and system for advertising inter-domain routes”. European Patent No. 13176712.1-1853. 2013.

Contact rougier@telecom-paristech.fr

REFLEX
Multiband Digital Predistortion

Parties prenantes

TELECOM ParisTech

ESIEE PARIS

Auteurs

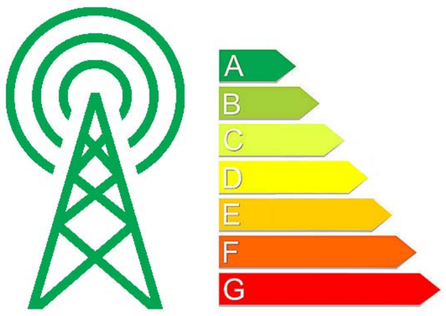
Dang-Kièn Germain Pham
Patricia Desgreys
Mazen Abi Hussein
Olivier Venard
Patrick Loumeau

Partenaires

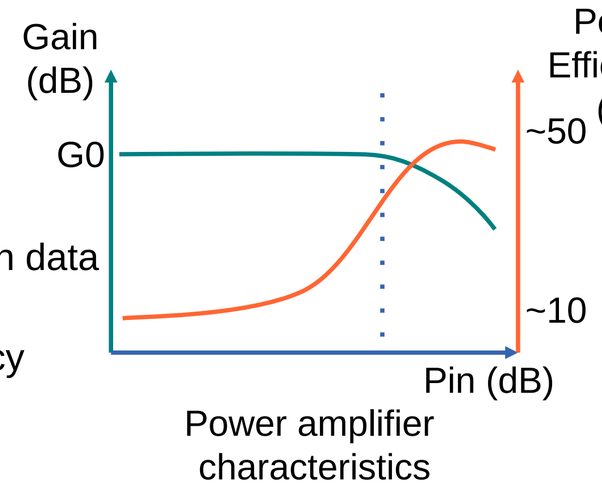
FONDATION TELECOM

INSTITUT CARNOT Télécom & Société numérique

MOTIVATIONS

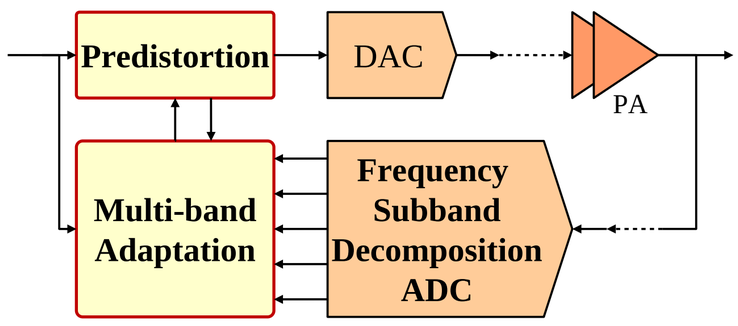


- Future telecommunication networks: More and more wireless devices, High data rate transmissions, Reduce energy footprint
- Main contributor: Base station power amplifier, Trade-off Linearity/Efficiency



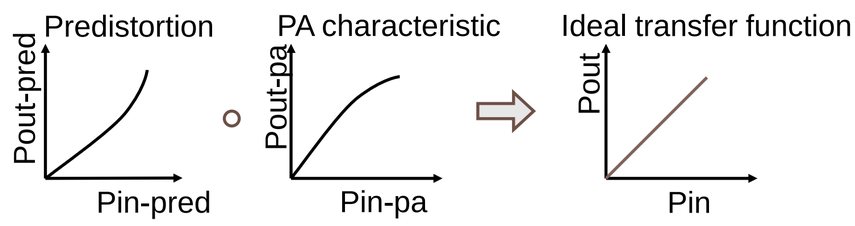
Power amplifier characteristics

Multirate Digital Predistortion



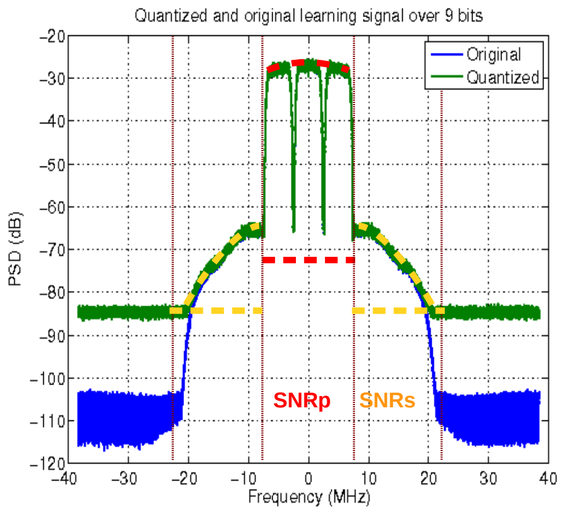
- Develop an algorithm for digital predistortion adapted to a multi-band ADC

- DPD principle



- ADC : Optimized parallel bandpass ΣΔ ADC
  - MSNBC architecture [patented in 2012]

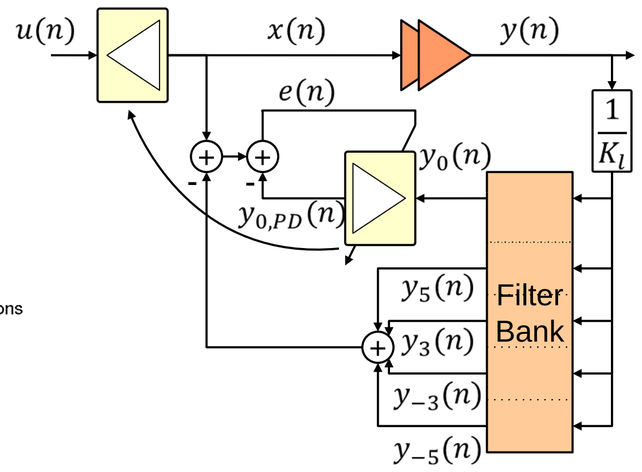
SUBBAND QUANTIZATION EFFECT ON A CLASSIC DPD SYSTEM



Simulation results summary

- Case 1 : Uniform quantization
  - Same « quantum » for each subband
  - Optimum resolution : 10 bits
- Case 2 : Fix resolution of the high power subband
  - Set the SNR of subband 'P'= 64dB
  - Correction perf. very sensitive to the quantization of adjacent bands
- Case 3 : Fix resolution of the adjacent subbands
  - Set the SNR of subband 'S'= 22dB
  - The resolution of the high pow. subband can be reduced to 8 bits

SUBBAND DIGITAL PREDISTORTION ALGORITHM



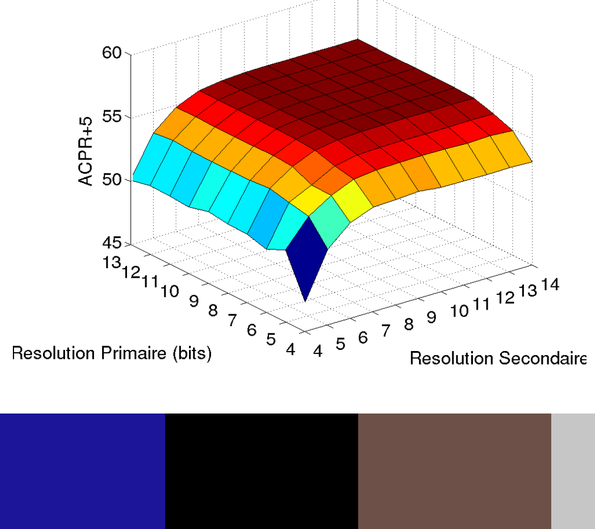
- PA model : Memory-polynomial
- DPD model : Memory-polynomial

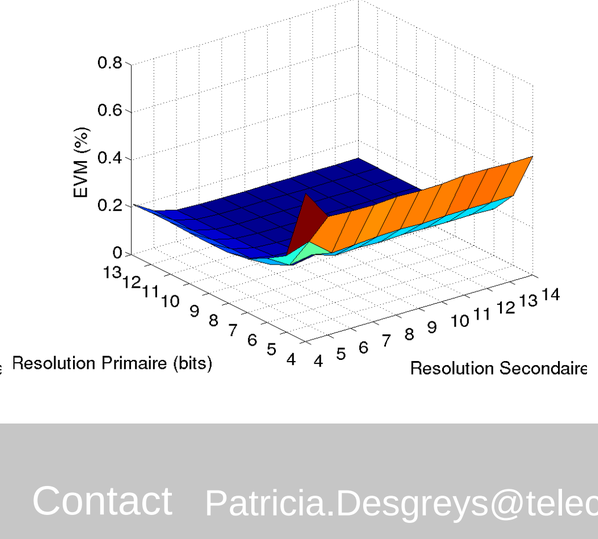
- Performance metrics :
  - ACPR:

    More sensitive to quantization of adjacent subbands for low resolutions
  - EVM:

    Depends mostly on quantization of the high power subband

Performance metrics simulated results





Future work

- Multirate implementation
- Feasibility study on the implementation on digital processor (DSP / FPGA)
- Resource gain estimation

Contact Patricia.Desgreys@telecom-paristech.fr

SMART GRID

PhDs: BLIMAN Federico, HORTA Jose, KADDAH Rim, OBADIA Mathis
Advisors: KOFMAN Daniel and ROUGIER Jean-Louis

Why a smarter grid?

- Reduce CO2 emission (The 20-20-20 targets)
- Energy self sufficiency
- Enhance reliability
- Reduce capex and opex costs
- Advanced service models

Means

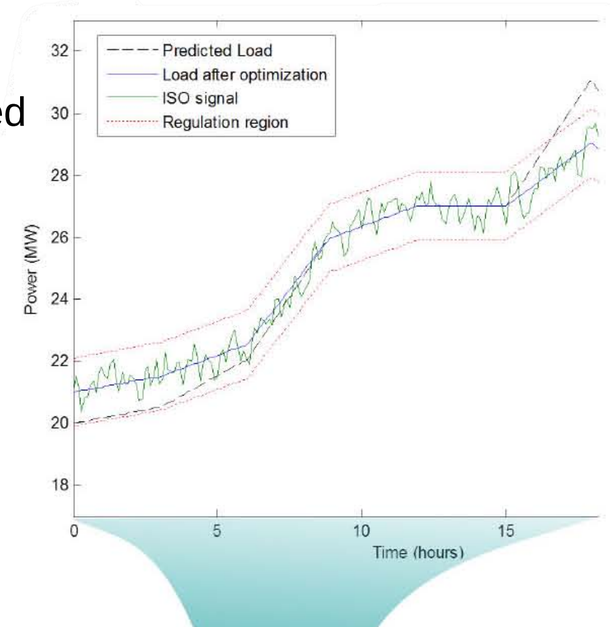
- Change the load curve shape (reduce peak, lower consumption)
- Distributed energy resources
- Renewable energy sources (wind, PV,…)
- Enhance efficiency

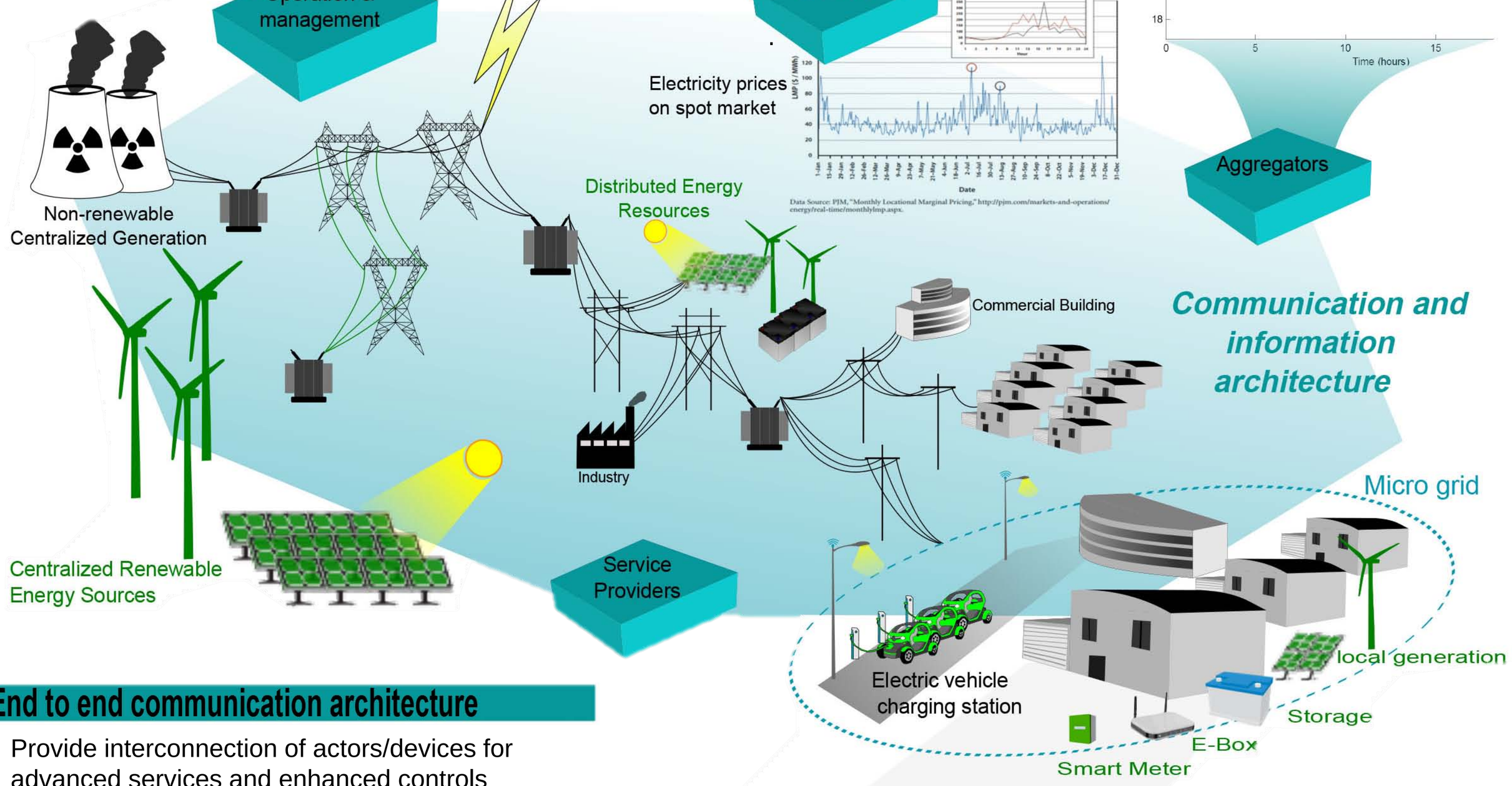
Crisis management (power shortage)

- Traditional approach: Rolling blackout
- Our approach: **Differentiated services**
  - Continuous supply for **critical** loads
  - Take into account **utility** for users depending on their characteristics, environmental conditions and appliances' operation
  - **Fairness**

Aggregators

- Provide advanced DR mechanism to leverage consumers' storage capabilities and load and generation flexibility
- Enable prosumers' participation in the electricity market, including ancillary market
- Dynamically optimize Aggregator's decisions based on: load forecasts, client policies, market prices, flexibility capabilities and ISO signals



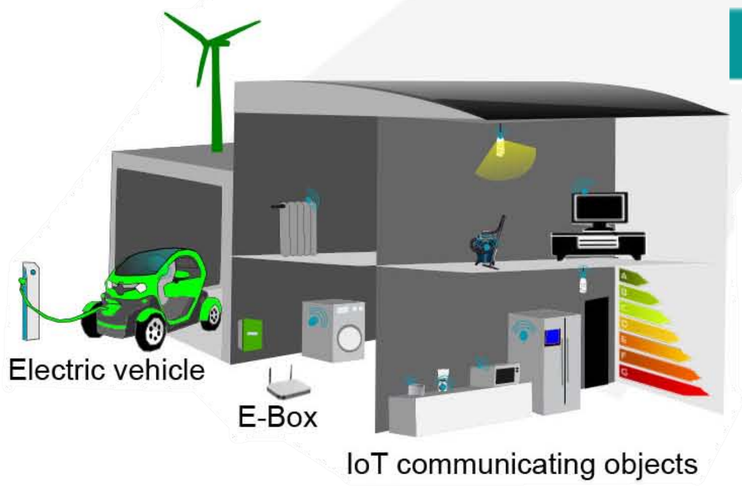


End to end communication architecture

- Provide interconnection of actors/devices for advanced services and enhanced controls
- Optimal distribution of overall system intelligence
- Requirements: Interoperability, Flexibility, Reliability, Security, CAPEX & OPEX.
- Based on ESOs work for M/490 mandate

Internet of Things

- Architecture for customer energy management system targeting autonomic policies' implementation:
  - auto-discovery, self-configuration and self-healing
- Solutions for advanced grid monitoring and control
- Smart grid, vehicles, cities and homes convergence



Microgrid Management

- Manage cooperatively electricity production and consumption locally on a neighborhood or campus level
  - Leverage local storage and renewable energy sourcing capabilities
  - Enhance efficiency (e.g., less transport losses)
- Ensure overall system visibility, stability and predictability

Lisp-Lab

Building Today the Internet of Tomorrow

Institut Mines-Télécom

AGENCE NATIONALE DE LA RECHERCHE ANR

Auteurs

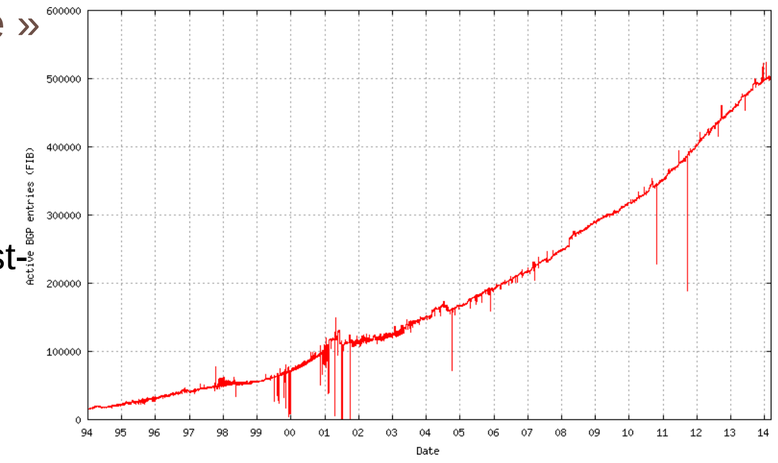
Luigi Iannone

Jean-Louis Rougier

Internet Scalability

When « large scale » is synonym of « complex and expensive »

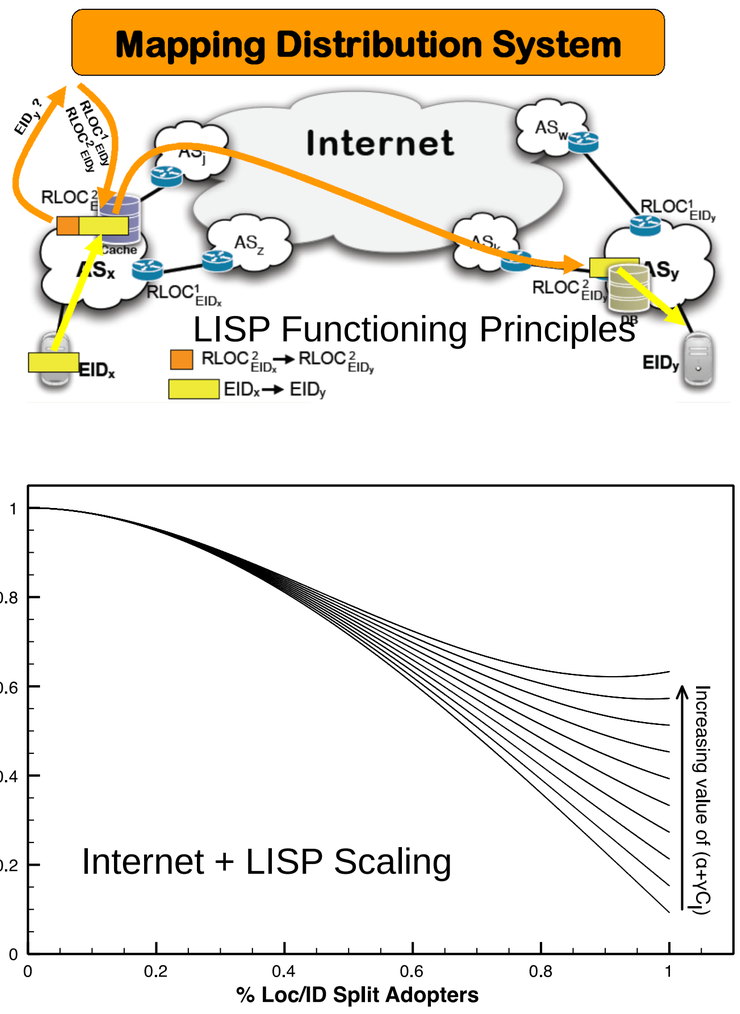
- BGP Routing Information Base (RIB) in the Default Free Zone is growing at fast rate, causing scalability problems.
- The “opex” costs for maintaining, updating, provisioning, and managing this large amount of entries, makes the Internet less cost-effective.
- Why this BGP Inflation?
  - **Single numbering space:** for both host transport sessions identification and network routing.
  - **Traffic Engineering:** BGP announces only the best-path, hence traffic engineering is performed by de-aggregating prefixes.



“Addressing can follow topology or topology can follow addressing. Choose one.”

Y.Reckter

Partenaires



LISP Functioning Principles

LISP: Locator/ID Separation Protocol

Toward a thinner Internet Core

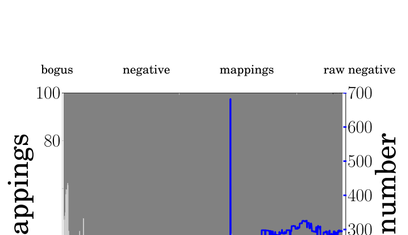
- LISP Principles: **Map-and-Encap**
  - Different addressing spaces to identify end-hosts and locate routing’s infrastructure end-points (stub domain’s border routers).
    - **End-system Identifiers (EIDs)**: End-systems are identified by their IP address, which lays in a separated space in respect of the inter-domain routing infrastructure.
    - **Routing LOCators (RLOC)**: The IP address of border router(s) locate, in the routing infrastructure, the attachment point of the domain to which a certain EID pertains.
- Map between the two spaces and tunnel (encap) packets in the core Internet.
  - **Mapping EIDs to RLOCs:** To set up end-to-end communication a mapping function is needed to associate the EIDs (the who) with the RLOCs (the where).

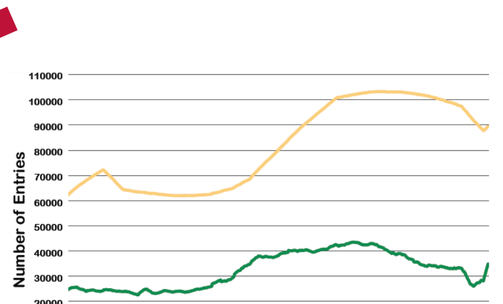
Internet + LISP Scaling

The LISP-Lab Approach

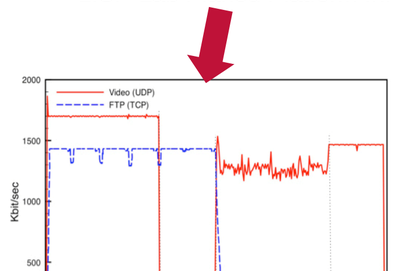
Leading the way to Future Internet Services

- The LISP-Lab Platform aims at providing an environment for high quality research and the design, development, and assessment of new services and use-cases.
- Technical tasks planned in the LISP-Lab project range from cloud networking, to access technology, through inter-domain connectivity, traffic engineering, and network management, has a large scope to boost innovation beyond the LISP technology itself.





LISP-Lab Planed Platform Infrastructure



Partenaires: LIP6, Alphalink, border 6, NONSTOP Systems, Orange Labs, Renater, UCOPIA COMMUNICATIONS, rezopole

Contact Luigi.Iannone@telecom-paristech.fr

Site web www.lisp-lab.org

Studying Information Dissemination in a D2D network using Call Details Records

Labs

TELECOM SudParis

s@movar CNRS Institut TELECOM

Authors

Rachit Agarwal
(rach.agarwal@gmail.com)

Vincent Gauthier
(vincent.gauthier@telecom-sudparis.eu)

Monique Becker
(monique.becker@telecom-sudparis.eu)

Thouraya Toukabrigunes
(thouraya.toukabrigunes@orange.com)

Hossam Afifi
(hossam.afifi@telecom-sudparis.eu)

Partner

orange™

Abstract

In a network of devices in close proximity such as Device to Device (D2D) communication, we study the dissemination of public safety information at country scale level. In order to provide a realistic model for the information dissemination, we extract spatial distribution of the population of Ivory Coast from census data and determine migration pattern from the call detail records obtained during the Data for Development (D4D) challenge [1]. We latter apply epidemic model towards the information dissemination process. We then propose enhancements to the dissemination model by adding latent states and beamforming to the epidemic model. In this paper, we study the transient states towards the evolution of the population having the information for different cases. Through the results we show that enhancements in the dissemination process can be achieved in large and realistic scenarios.

Context: Dissemination of emergency information in metapopulation and dynamic network using epidemic model.

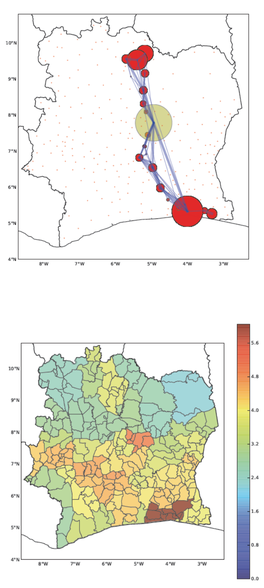
Data Analysis

- **Extract User's movement at the country level from Call Details Records provided by Orange [1].**
- **Generate transition probability matrix (ν) from all movement patterns.**
- **Determine population density from Census data.**

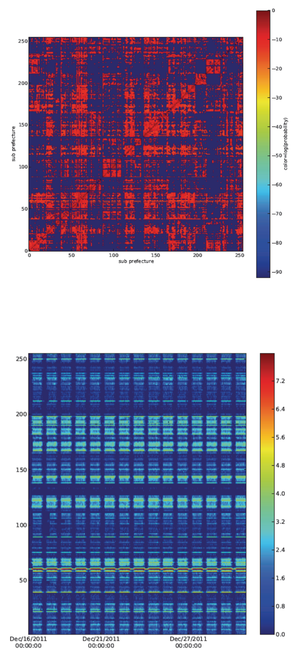
Model

- **Split the country into metapopulation [2,6] (subprefecture).**
- **Generate mobility between each meatpopulation base on our analysis of the CDR dataset of Orange.**
- **Add latent states to the initial SIR model in order to modelize a variable density of user in each metapopulation.**
- **Generate the epidemic process in order to simulate the spreading of information accross the country.**

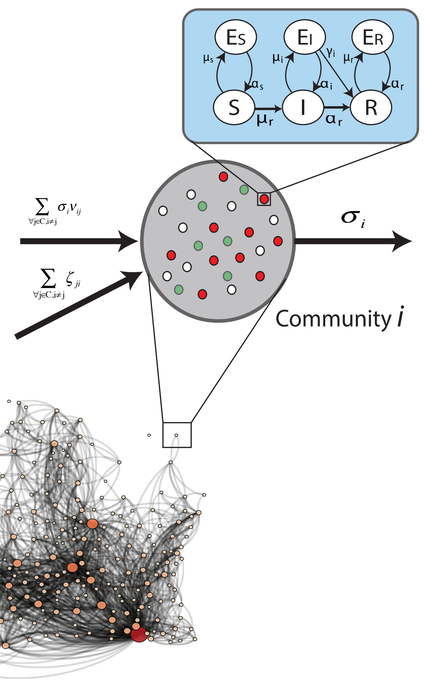
Raw data



Analysis

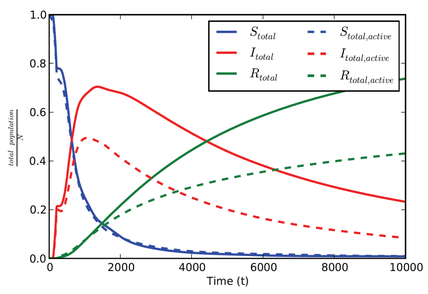


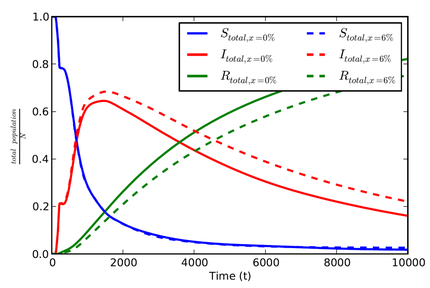
Diffusions model
(base on SIR spreading process)



Results

- **Variable people density affects the information spreading in mobile environment.**
- **Information spreading through local interaction could lead diffusion at country scale in a timely maner (Cf. Video [3]).**
- **We solve numerically a large system of differential equations to compute the spatio-temporal evolution of the diffusion.**
- **We validate the result by simulations using the Gillespie algorithm (Tau-Leap).**





Conclusion

We first display as supplementary material a movie [3] that shows the diffusion process in Ivory Coast. We can see that the diffusion that initially takes place in the East side of the country, is spreading quickly into the major cities of Ivory Coast through: Abidjan (the economic captital), Bouak (the second largest city), Youkousono, (Political Capital) Soudre. Later on, the information is spreading more slowly into less populated areas, mostly from Est to West. The West side of the country is well know to be mostly an agricultural region (Cooa, coffee, rice). We can also notice that the diffusion of the information takes a very long time to spread over the northern part of the country. As Suggested by [4] whom have been working on the same datasets, the fact that the northern part of the country is less diffusive might be the consequence of socio-economic disparity in place inside the country. Highlighting on the fact that this part of the country is still relatively "disconnected from the main economic and political center of Côte d'Ivoire".

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[3] R. Agarwal, V. Gauthier, and M. Becker, **Diffusion process using mobility data available for D4D challenge**, http://dx.doi.org/10.6084/m9.figshare.69817, 2013.

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[6] V. Colizza and A. Vespignani, **Epidemic modeling in metapopulation systems with heterogeneous coupling pattern: theory and simulations**, Journal of theoretical biology, vol. 251, no. 3, pp. 450–467, 2008.

Le colloque **Numérique : Grande échelle et complexité**, 26 et 27 mars 2014, Institut Mines-Télécom

Contact: vincent.gauthier@telecom-sudparis.eu

http://complex.luxbulb.org/content/d4d-challenge

Understanding the Evolution of Multimedia Content in the Internet through BitTorrent glasses

Reza Farahbakhsh*, Angel Cuevas*, Ruben Cuevas, Roberto Gonzalez**, Noel Crespi***
* Institut Mines-Telecom, Telecom SudParis, France, CNRS UMR5157, RS2M department, Service Architecture Group.
** Universidad Carlos III de Madrid, Spain

Measurement Methodology & Dataset

- Large scale measurement over **The Pirate Bay (TPB)** portal
- The tool subscribes to TPB's RSS service to get a notification for any new content
- The RSS feed provides the .torrent file
- Retrieves IP of the tracker from the .torrent and connects to it immediately
  - Identify the first IP (first seeder) as publisher
  - captures the IP address of a majority of consumers.
- We use MaxMind to determine the location of Publishers and Consumers.
- In Summary: (i) publisher's username and IP address (ii) list of majority of consumers

	pb09	pb10	pb11	pb12
Crawling Period	11/28/09–12/18/09	04/09/10–05/05/10	10/21/11–12/13/11	01/28/12–02/12/12
Duration (days)	21	27	54	16
Torrents	15.8K	38.2K	72.0K	21.0K
Downloads	—	95.6M	79.0M	11.1M

Analysis & Results

Content Evolution Analysis

Content Availability Evolution

Category	pb09 (%)	pb10 (%)	pb11 (%)	pb12 (%)
AUDIO	15.958	15.208	12.535	13.884
Music	10.118	10.796	7.984	8.414
Audio Books	0.376	0.728	0.579	0.608
Sound Clips	0.162	0.076	0.095	0.120
FLAC	1.757	1.218	1.894	1.910
Other	3.546	2.390	1.984	2.833
VIDEO	39.234	41.266	52.260	46.272
Movies	23.004	20.084	20.623	19.924
Movies DVDR	–	1.625	1.448	2.029
Music Videos	1.646	2.340	1.151	1.608
Movie Clips	–	0.433	0.237	0.493
TV shows	11.913	14.216	21.996	15.435
Handhled	0.207	0.258	0.353	0.110
Highres – Movies	1.348	0.644	1.842	1.728
Highres – TV shows	–	0.603	3.690	4.039
3D	–	–	0.072	0.014
Other	1.115	1.062	0.849	0.890
APPLICATIONS	16.788	9.922	3.986	5.006
Windows	13.514	9.283	3.371	3.647
Mac	0.726	0.258	0.238	0.345
UNIX	0.071	0.089	0.136	0.235
Handheld	0.292	0.133	0.031	0.014
IOS(Ipad/Iphone)	–	–	0.051	0.302
Android	–	–	0.097	0.349
Other OS	2.184	0.159	0.061	0.115
GAMES	4.997	3.253	3.084	4.236
PC	3.636	2.599	2.642	3.039
Mac	0.039	0.037	0.043	0.072
PSx	0.181	0.063	0.088	0.254
XBOX360	0.201	0.099	0.070	0.148
Wii	0.389	0.198	0.141	0.168
Handheld	0.551	0.258	0.102	0.053
IOS(Ipad/Iphone)	–	–	0.026	0.211
Android	–	–	0.232	0.177
Other	0.402	0.279	0.092	0.115
PORN	8.264	21.553	21.140	23.007
Movies	5.950	10.767	9.097	10.386
Movies DVDR	–	0.532	0.014	0.057
Pictures	1.232	1.688	0.971	1.206
Games	0.091	0.026	0.015	0.077
Highres – Movies	0.201	0.511	1.878	2.422
Movie Clips	–	7.308	8.670	8.313
Other	0.791	0.720	0.494	0.546
OTHER	14.759	8.798	6.994	7.595
E-books	5.185	4.352	3.865	5.068
Comics	0.421	1.059	1.316	1.278
Pictures	2.930	2.173	1.227	1.163
Covers	0.058	0.016	0.021	0.005
Physibles	–	–	–	0.005
Other	6.164	1.198	0.565	0.077

Proportion of each content type (portion of available content)

- Movies/TV shows (in VIDEO) are the most available contents. (>34% of the total content)
- if we add PORN-Movies subcategory, 40%-50% for Movies and TV Shows.
- Increment of the High Resolution content (from 1% to 10%)

Content Popularity Evolution

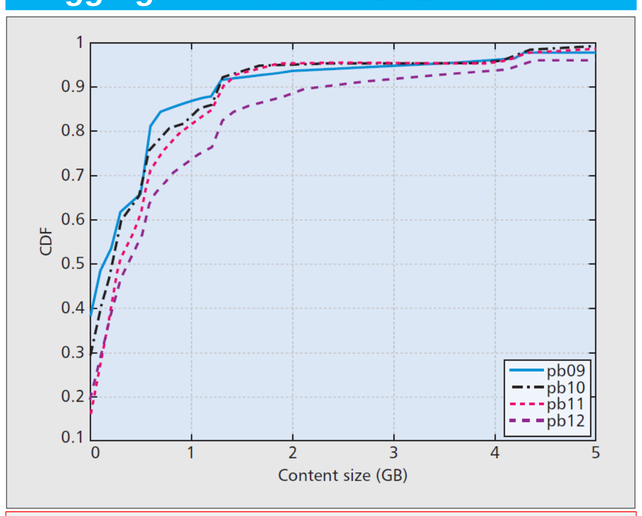
Categories	pb10 (%)	pb11 (%)	pb12 (%)
AUDIO	4.671	5.574	4.972
Music	3.814	3.977	1.036
Audio Books	0.119	0.213	0.093
Sound Clips	0.011	0.065	0.053
FLAC	0.208	0.297	0.292
Other	0.518	1.021	3.498
VIDEO	71.299	64.080	58.925
Movies	41.394	29.874	22.667
Movies DVDR	0.937	1.027	0.943
Music Videos	0.443	0.245	0.284
Movie Clips	0.066	0.037	0.097
TV shows	26.448	27.010	28.349
Handhled	0.127	0.040	0.014
Highres — Movies	0.766	3.533	3.702
Highres — TV shows	0.723	2.205	2.826
3D	–	0.025	0.000
Other	0.396	0.086	0.043
APPLICATIONS	2.117	0.996	0.810
Windows	2.041	0.934	0.725
Mac	0.050	0.041	0.027
UNIX	0.002	0.002	0.000
Handheld	0.018	0.001	0.000
IOS(Ipad/Iphone)	–	0.003	0.002
Android	–	0.012	0.054
Other OS	0.006	0.001	0.001
GAMES	1.274	2.182	1.013
PC	0.790	1.747	0.756
Mac	0.003	0.003	0.000
PSx	0.018	0.023	0.006
XBOX360	0.027	0.119	0.165
Wii	0.144	0.102	0.019
Handheld	0.216	0.022	0.001
IOS(Ipad/Iphone)	–	0.005	0.006
Android	–	0.154	0.056
Other	0.075	0.007	0.004
PORN	17.256	24.300	31.012
Movies	11.259	13.209	17.685
Movies DVDR	0.034	0.014	0.025
Pictures	0.740	0.255	0.598
Games	0.007	0.004	0.009
Highres — Movies	0.385	1.727	3.089
Movie Clips	4.559	8.827	8.388
Other	0.272	0.264	1.218
OTHER	3.383	2.868	3.268
E-books	1.337	2.099	2.604
Comics	0.326	0.225	0.115
Pictures	1.307	0.266	0.258
Covers	0.003	0.000	0.000
Physibles	–	–	0.000
Other	0.410	0.278	0.291

Distribution of content popularity (proportion of download sessions)

- VIDEO is the most popular category by attracting more than 60%
- PORN appears as the 2nd most popular category among BitTorrent users.
- 90% of the total downloads comes from VIDEO and PORN
- High-resolution PORN and VIDEO popularity increase (from 1.87% to 9.62%)

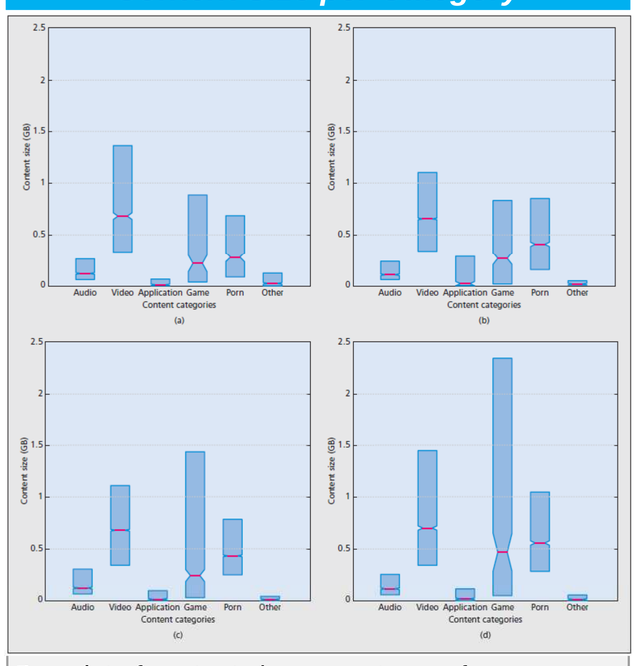
Content Size Analysis

Aggregate Content Size Distribution



- BitTorrent content has doubled its size in a period of 2 years
- in median from 223 MB to 458 MB

Content Size per Category



Box plot of content size per category for (a) pb09, (b) pb10, (c) pb11 and (d) pb12 (25^{th}, 50^{th} 75^{th} percentile)

Main Finding & Conclusion

- This work is a thorough analysis on the evolution of multimedia content available in the most popular BitTorrent portal over a two years period between Nov. 2009 and Feb. 2012.
- The major part of the Internet traffic, sustained in four main findings:
  - Multimedia content has doubled its size in a period of only 2 years.
  - The major part (80%) of the consumed multimedia content corresponds to TV Shows and Movies (including porn) that belong to those categories with the largest size.
  - High-resolution content, which has very large size, is increasing its presence by 5 times in two years and it already represents 8% of the available content and 10% of the downloads in our most recent snapshot dated at the beginning of 2012.
  - Audio represents 12%-15% of the available content but only attracts only 5% of the downloads.

Reference:

- R. Farahbakhsh, A. Cuevas, R. Cuevas, R. Gonzalez, N. Crespi, "Understanding the evolution of multimedia content in the Internet through BitTorrent glasses". IEEE Networks Magazine, November 2013.

Plateforme CREDO «FTTH: De l'infrastructure aux usages »

Auteurs

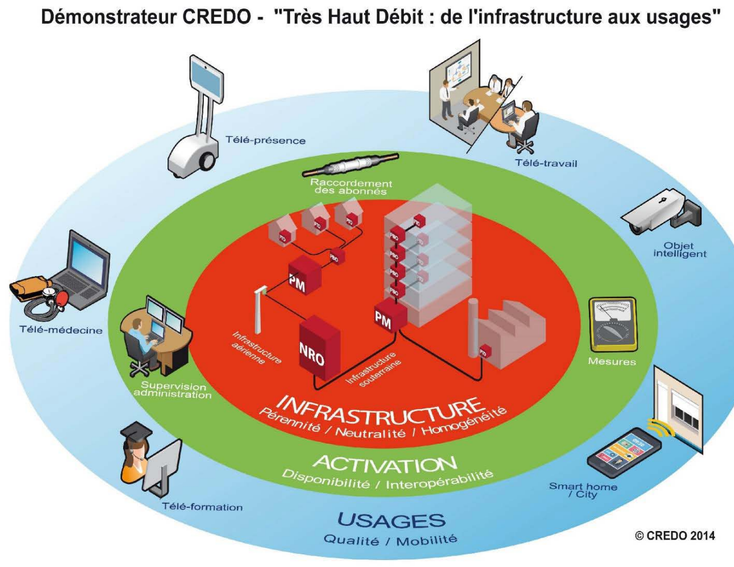
Eric Gangloff

Laurent Bernard

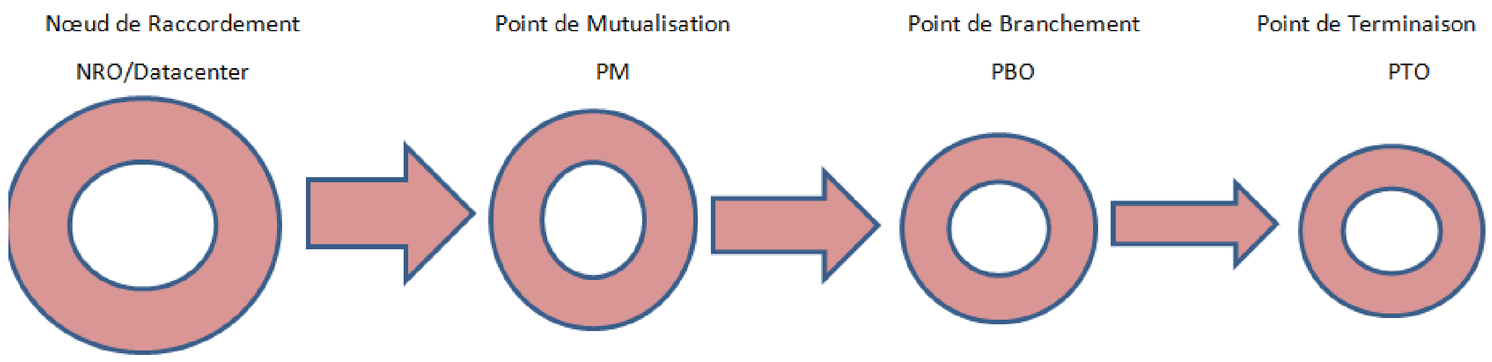
Partenaires

La Fibre: une révolution en marche

Les Infrastructures de réseaux d'accès
Les nouveaux usages



Infrastructures de réseaux d'accès

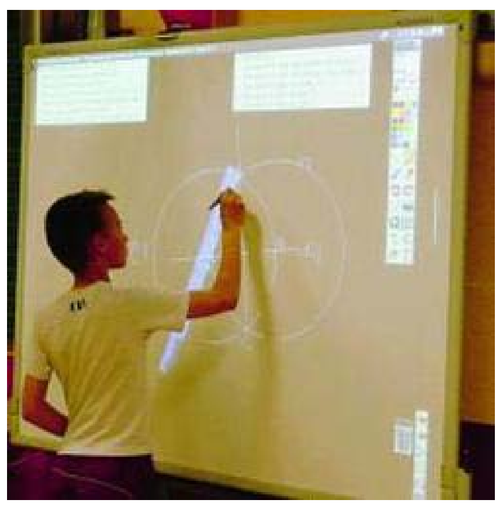


La plateforme CREDO modélise un vrai réseau optique fonctionnel en établissant des chemins physiques et logiques du point de présence des opérateurs dans les nœuds de raccordements optiques (NRO) à la prise habitation (PTO). Il permet ainsi d'appréhender et de comprendre toutes les fonctions du réseau

Les nouveaux usages

La plateforme met en valeur l'apport du FTTH pour de nouveaux usages tous consommateurs de bande passante:

- Les services à la personne
- La télé médecine
- Le télé travail et la télé formation (skype haute définition) ;
- Le divertissement et les média sociaux.



Les services associés

La plateforme est ouverte à l'accueil:

- de présentations: collectivités territoriales, ….
- de projets étudiants
- d' expérimentations de nouveaux usages avec des partenaires académiques et industriels

Contact eric.gangloff@ telecom-sudparis.eu Site web

Projet VELCRI

Véhicule électrique **Communication Véhicule Infrastructure (V2G)**

Télécom SudParis

Hossam Afifi
hossam.afifi@it-sudparis.eu

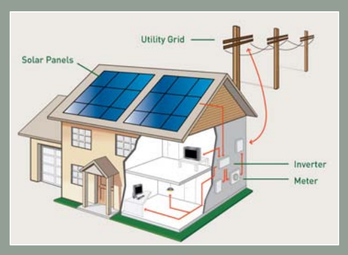
Michel Marot
Michel.marot@it-sudparis.eu

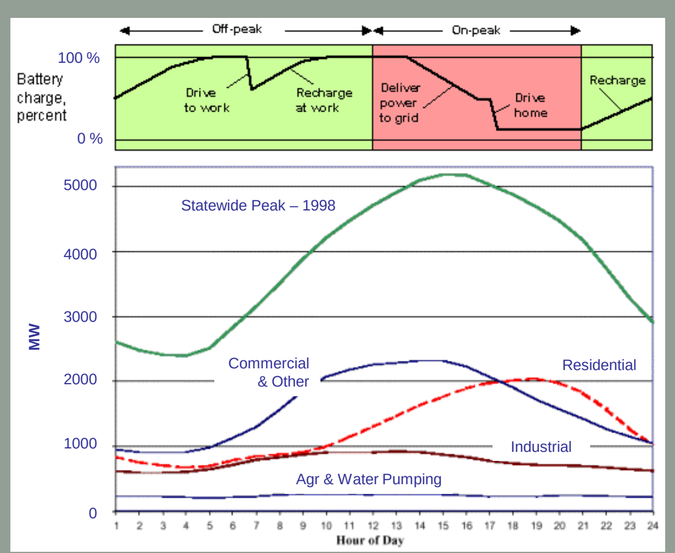
Télécom ParisTech

Houda Labiod

Un nouvel écosystème

Fournis de l'énergie &
Échange de l'information

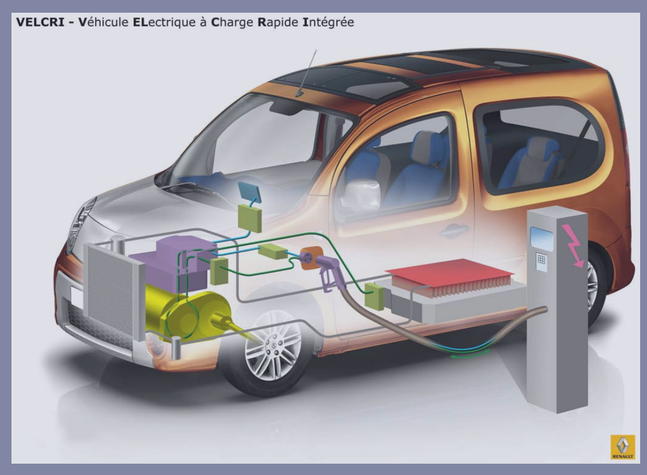




Fournisseur d'énergie (distribué) &
Echange de l'informations

Besoin de Communications

- Mesurer, échanger
  - La consommation des véhicules
  - L'état de charge de la batterie
- Optimiser la recharge des véhicules en fonction :
  - De la localisation
  - De la demande en énergétiques
  - De la disponibilité de la production d'énergie
  - Du type de batterie
- Fournir la tarification adapté à tout type de recharge/échange de batteries



Communications de machine à machine

Un environnement multi-utilisateur, multi opérateurs, et distribué

- Développement d'une interface sécurisée de communication entre le véhicule et l'infrastructure de distribution d'électricité (sans fil, filaire)
  - Communication Multimodale
  - Inspiration du système de roaming du réseau cellulaire pour l'identification, l'authentification et la facturation (sur facture domicile)
  - Pervasivité des moyens de communications dans le véhicule
  - Authentification des véhicules, et le paiement sécurisé des recharges
- Communication du niveaux de la batterie aux différents éléments du réseau
  - Stations de recharge
  - Infrastructure de production d'énergie
- La batterie devient un élément de stockage d'énergie faisant partie du réseau de distribution d'énergie

Janvier 2012

eCOUSIN

enhanced COntent distribUtion with Social INformation

eCOUSIN designs a novel social-aware network architecture that exploits social-content interdependencies with built-in content dissemination functionalities to improve its efficiency.

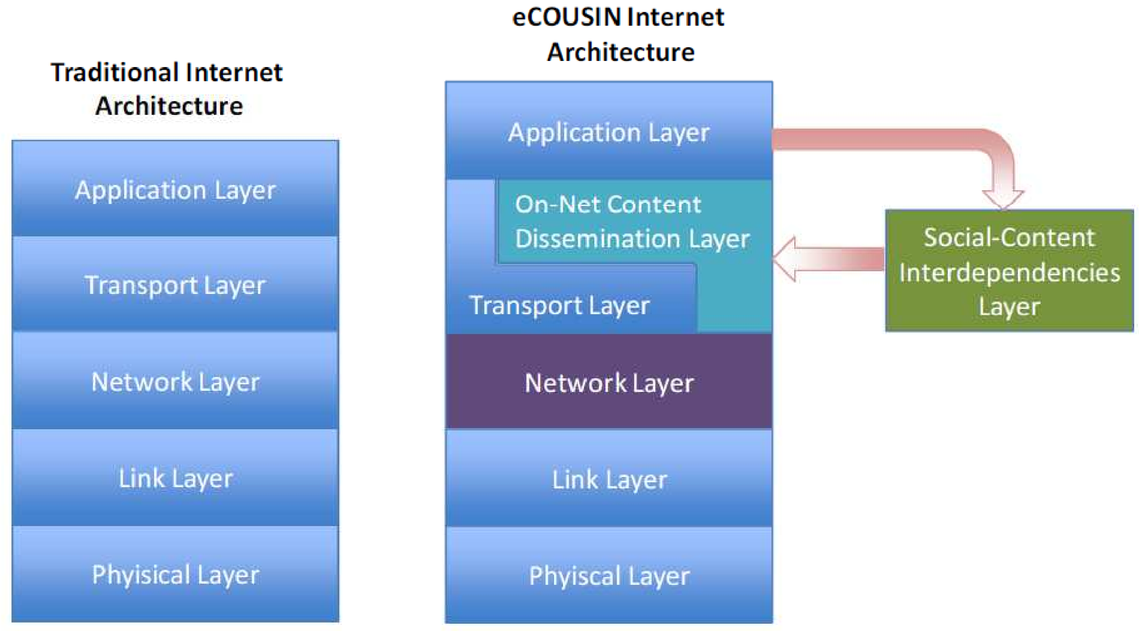
Context : Social-Content Revolution

- Online Social Networks (OSNs) have drastically changed the way contents are consumed on the Internet:

Users consume contents based on the information shared through OSNs.

The popularity of a content is highly impacted and often dictated by its "social" success.

- Operators need to evolve and optimize their network to avoid being overwhelmed by the ever growing traffic volumes resulting from this paradigm change



eCOUSIN Objectives

Design a novel social-aware network architecture that exploits the social-content interdependencies with built-in content dissemination functionalities to improve its efficiency

- Implement high performance distributed tools for collecting necessary data to study and model the social-content interdependencies
- Improve the scalability of network infrastructures when handling contents by exploiting social information
- Design an on-net operational framework that tightly integrates network functionalities and content-related service functionalities
- Design of algorithms that exploit social information for placing and delivering contents in an optimized manner with a special focus on mobile environments

Key Challenges

- Model social-content interdependencies based on gathering information of users' real-time interactions, and on the interdependencies between user interaction in OSNs and the resulting behaviour over content distribution services
- Extend content replication, placement, search and retrieval techniques with additional information extracted from OSNs
- Investigate proper naming schemes for OSN traffic delivered onto Information Centric Network (ICN); how OSNs can adapt them to the ICN paradigm, and how ICN routing can benefit from the OSNs' social links to improve its routing and forwarding strategy
- Develop and evolved a management system for content placement and delivery to mobile users by exploiting statistical patterns derived from mobility-, connectivity- and social information.

Expected Impacts

- Offer to European citizens a vastly improved content delivery experience
- By placing the right content closer to the user, media streams can be delivered at higher transfer rates and with lower delay, without increasing the burden on the network infrastructure

SEVENTH FRAMEWORK PROGRAMME

eCousin
http://www.ict-ecousin.eu

PROJECT DATA

-Start Date: 11/2012
-Duration: 30M
-EU Funding: 2,998M€

CONSORTIUM

ORANGE, France;
TELECOM ITALIA, Italy;
TELECOM SUD-PARIS, France;
IMDEA NETWORKS, Spain;
ALCATEL LUCENT, Belgium/Germany;
TECHNISCHE UNIVERSITAT Darmstad, Germany;
UNIVERSITY OF CAMBRIDGE, United Kingdom;
UNIVERSIDAD CARLOS III DE MADRID, Spain

Contact:
Yannick Le Louedec, ORANGE, France
Email: yannick.lelouedec@orange.com
Noel Crespi, IMT-TSP, France
noel.crespi@mines-telecom.fr

Services Réseaux Programmables SDN for cloud networking: optimal provisioning and instantiation

Authors

Marouen Mechtri and Djamal Zeghlache

In collaboration with Hadji Makhlouf (now with IRT SystemX)

Optimal selection & provisioning

Objectives

- Optimal selection of virtual services (compute, storage and communications) according to users' and tenants' requests and requirements (QoS and SLA)
- Address the entire workflow from requests to instantiation and adaptation and rely on SDN services to achieve instantiation.

Contributions

- Exact model and heuristic algorithm to scale to thousands of nodes and links
- Convergence of clouds and networks
- Rely on sharing, virtualisation and SDN principles

Mathematical Models

Exact Virtual Network Mapping

- Joint node and link selection
- Mathematical Programming Formulation

$$\min Z = \sum_{i \in V_P} \sum_{k \in V_T \setminus R} d(i,k) x_{ik} + \quad \text{Placement}$$

$$\sum_{(ij) \in E_P} \sum_{\substack{k_1 \in V_T \setminus R \\ k_1 \neq k_n}} \sum_{k_n \in V_T \setminus R} d_1(ij, P_{k_1,k_n}) y_{ij,k_1,k_n} + \quad \text{Inter domain Path}$$

$$\sum_{(ij) \in E_P} \sum_{k_1 \in V_T \setminus R} d_2(ij,k_1) y_{ij,k_1,k_1} \quad \text{Intra domain Path}$$

$$d_1(ij, P_{k_1,k_n}) = \begin{cases} 1, & \text{if } CPU(i,k_1) \text{ and } CPU(j,k_n) \,\& \\ & STO(i,k_1) \text{ and } STO(j,k_n) \& \\ & MEM(i,k_1) \text{ and } MEM(j,k_n) \& \\ & lat_{ij} \geq lat_{k_1,k_n}; \\ 0, & \text{otherwise.} \end{cases} \quad \text{and} \quad d_2(ij,k_1) = \begin{cases} 1, & \text{if } cpu_i + cpu_j \leq CPU_{k_1}; \\ 0, & \text{otherwise.} \end{cases}$$

V_T is the set of vertices and E_P the set of edges of the physical or reference or target graph, d(i, k), x_{ij} and y_{ij,k_n,k_m} are Boolean variables indicating if a virtual resource is mapped on a physical one (nodes & links)

Additional Constraints

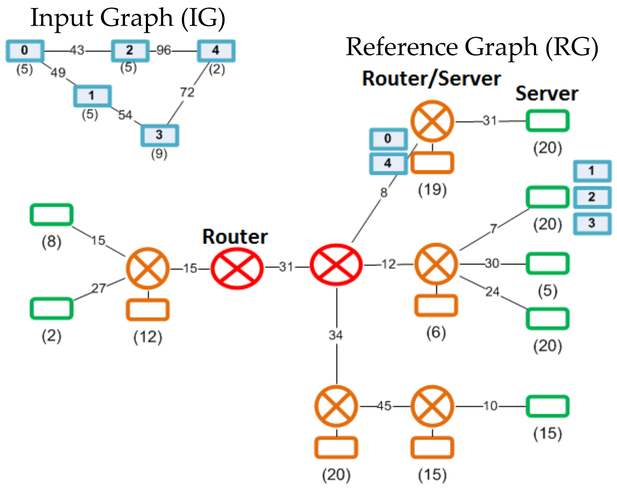
- Node mapping $\sum_{k \in V_T \setminus R} x_{ik} = 1, \forall i \in V_P$
- Limited storage $\sum_{i \in V_P} sto_i x_{ik} \leq STO_k, \forall k \in V_T \setminus R$
- Node & Link mapping

$$\sum_{k_1 \in V_T \setminus R} \sum_{k_n \in V_T \setminus R} y_{ij,k_1,k_n} = 1, \forall (ij) \in E_P$$

$$\sum_{k_n \in V_T \setminus R} y_{ij,k_1,k_n} = x_{ik_1}, \forall (ij) \in E_P, \forall k_1 \in V_T \setminus R$$

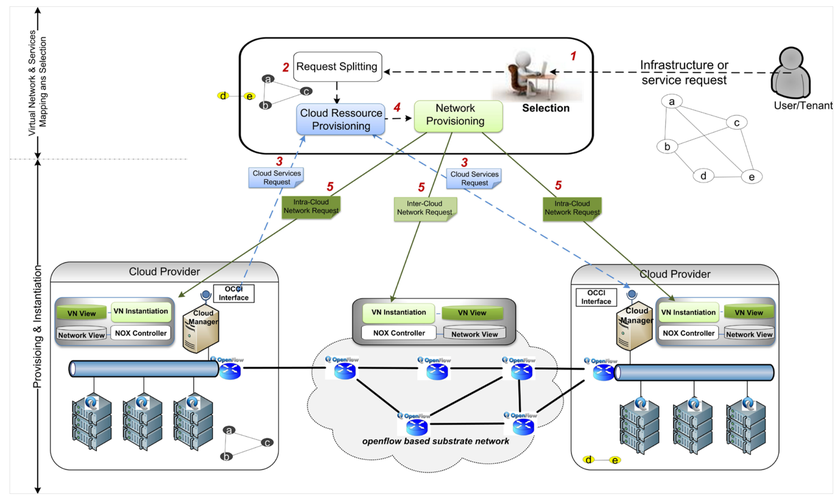
- Latency $lat_{k_1,k_n} y_{ij,k_1,k_n} \leq lat_{i,j}, \forall (ij) \in E_p, \forall k_1, k_n \in V_T \setminus R, k_1 \neq k_n$
- Localisation $x_{ik} + x_{jk} \leq 1, \forall i,j \in Sep, \forall k \in V_T \setminus R$

$$or \sum_{k \in V_T \setminus R} z_{ij}^k = 1, \forall i,j \in J \qquad x_{ik} + x_{jk} = 2 z_{ij}^k, \; \forall i,j \in J, \forall k \in V_T \setminus R$$

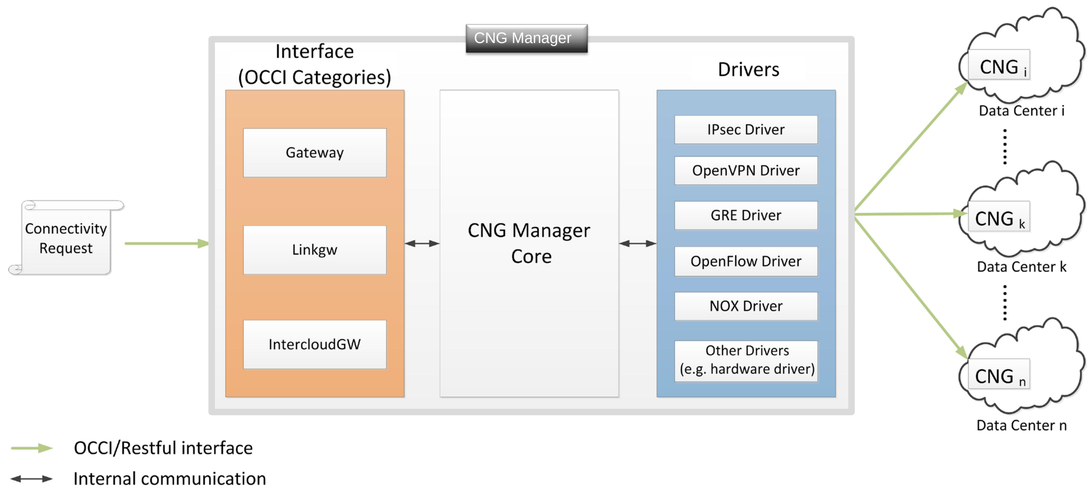


Example of resources localization constraints :
- virtual resources 0 and 4 in same node
- virtual resources 1, 2 & 3 in another node

Provisioning and instantiation process

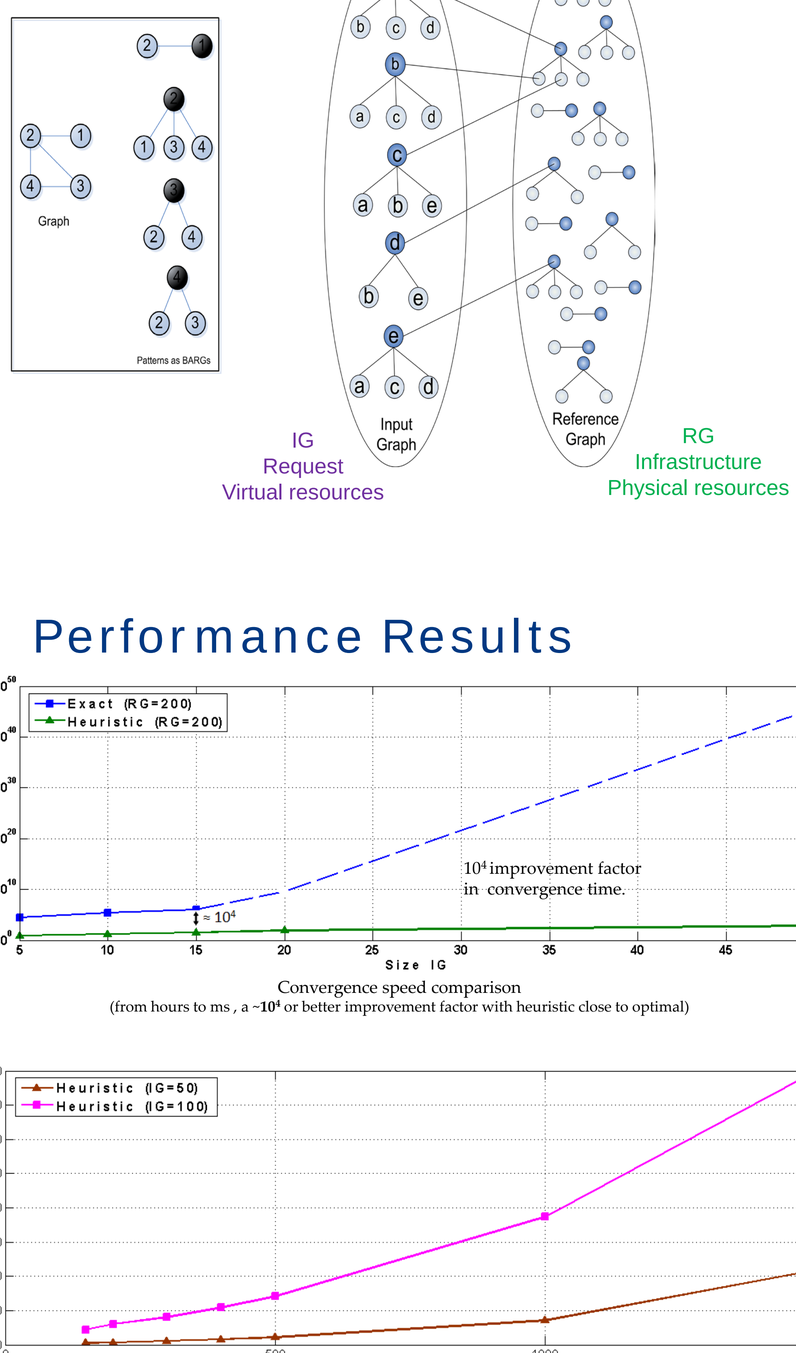


SDN compliant Instantiation/Networking System



Heuristic approach

- Based on graph patterns and bipartite request and reference graph mappings



Performance Results

Convergence speed comparison
(from hours to ms , a ~10^4 or better improvement factor with heuristic close to optimal)

Scalability of Heuristic Algorithm as a function of input and reference graph sizes

Distributed Architecture of Multiscale Context Management for the IoT

Objective: Design of a distributed context management framework for IoT context-aware applications

Parties prenantes

TELECOM SudParis

Auteurs

Chantal Taconet (responsable pour TSP)

Amel Bouzeghoub

Sophie Chabridon

Denis Conan

Léon Lim

Samer Machara Marquez

Sam Rottenberg

Partenaires

IRIT CNRS - INPT - UPS - UT1 - UTM

artal technologies

Financement

Projet INCOME

INfrastructure de gestion de COntexte Multi-Échelle pour l'Internet des Objets

ANR-11-INFR-009, 2012-2015

PROJET FINANCÉ PAR L'ANR - PROJECT FUNDED BY THE ANR

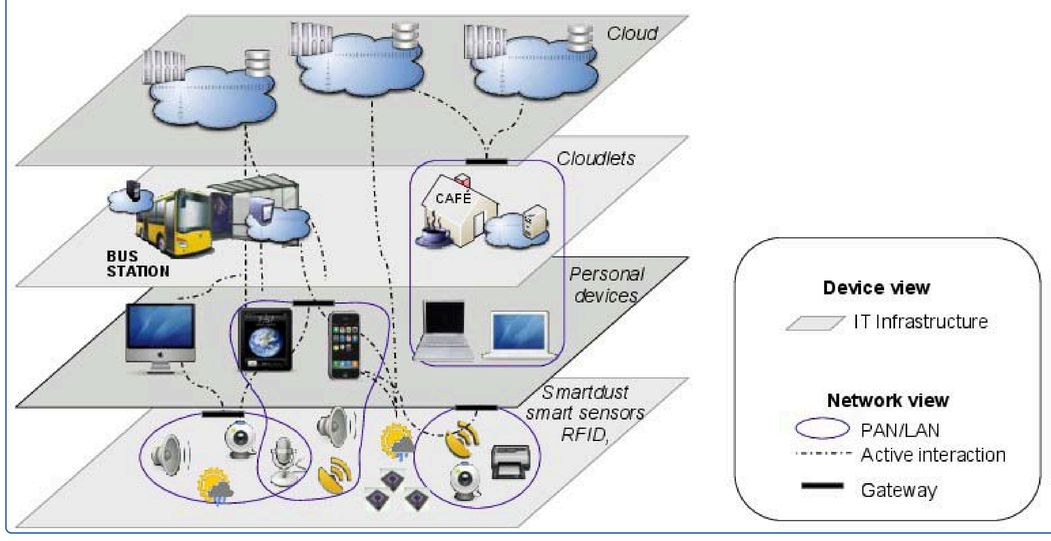
Context and problematic

IoT context-aware applications

- Smart cities, intelligent transport, leisure and entertainment, etc.

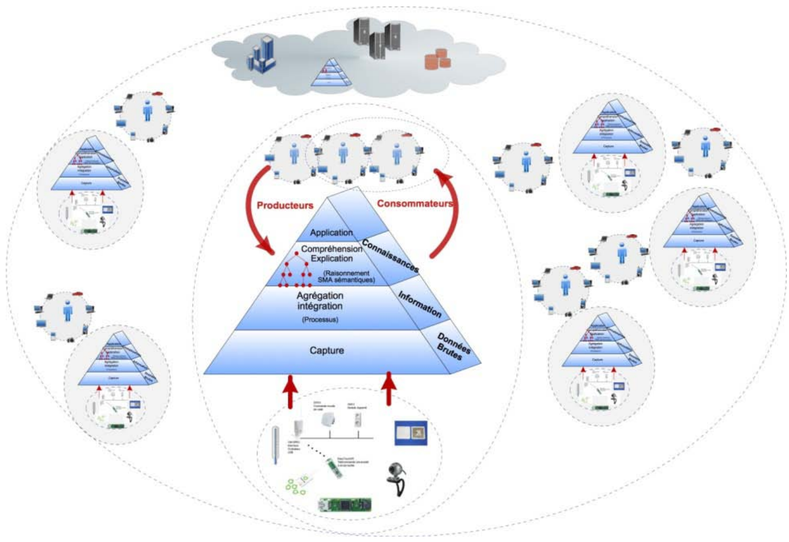
Infrastructure for the IoT

- Complex systems distributed over several levels of ICT
  - Smart objects, personal computers, proximity servers, cloud servers.



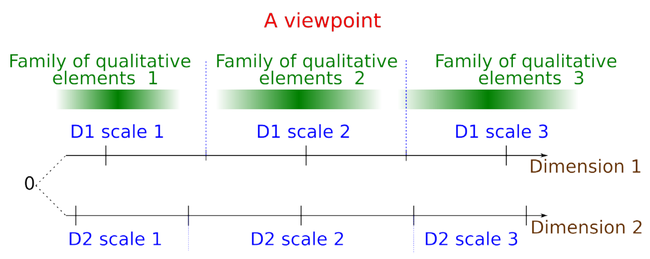
Context management for IoT applications

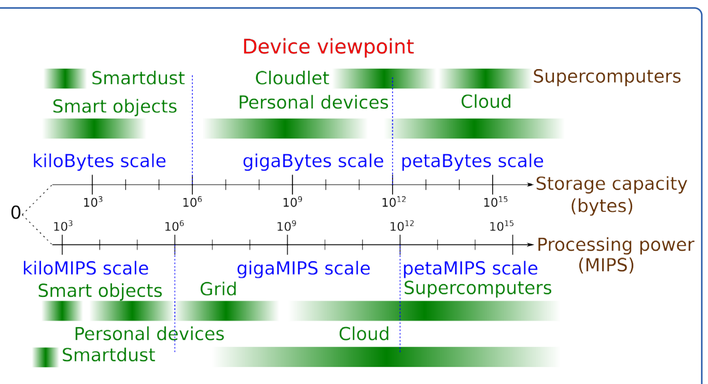
- Context management: data delivery, processing, and presentation
- Context management for the IoT
  - Context data perceived from ambient space but also from other spaces
  - Distribution of context data processing
  - Quality of context and privacy protection concerns

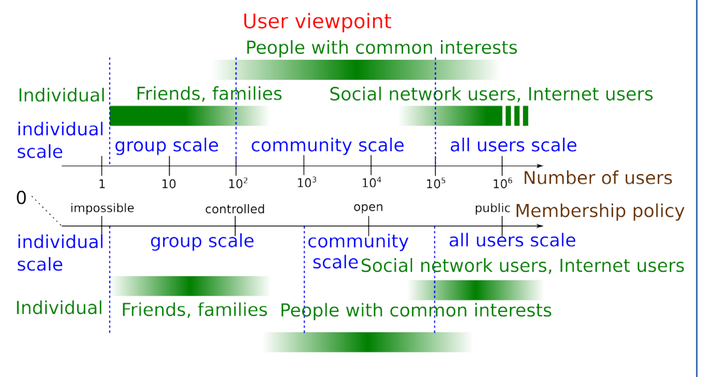


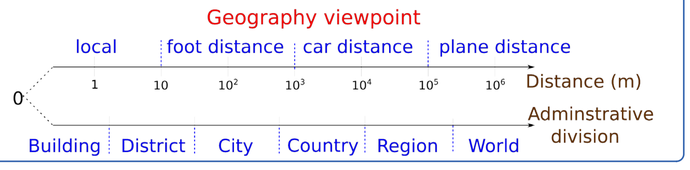
Approach: multiscale distributed systems

- Multiscalability ≠ scalability
  - Dealing with heterogeneity
- **Multiscale system characterization**
  - Model driven process to define
    - Viewpoints / Dimensions / Scales
- Constraints for context data delivery in terms of a multiscale characterization
  - Examples
    - Geography / Distance / Foot distance
      - Limit the car park information delivery to those at foot distance
    - Geography / Administrative division / City
    - \+ User / Membership policy / Group scale
      - Limit the delivery of GPS position to friends in the same city









Multiscale context management infrastructure

Architecture

- Distributed event-based system with push and pull modes
- Construction of spaces according to viewpoints, dimensions, and scales
- Intra-space brokering service using content-based filtering

  ⇒ Powerful and expressive filtering of context data
- Inter-space brokering service using topic-based filtering

  ⇒ Scalable filtering of context data

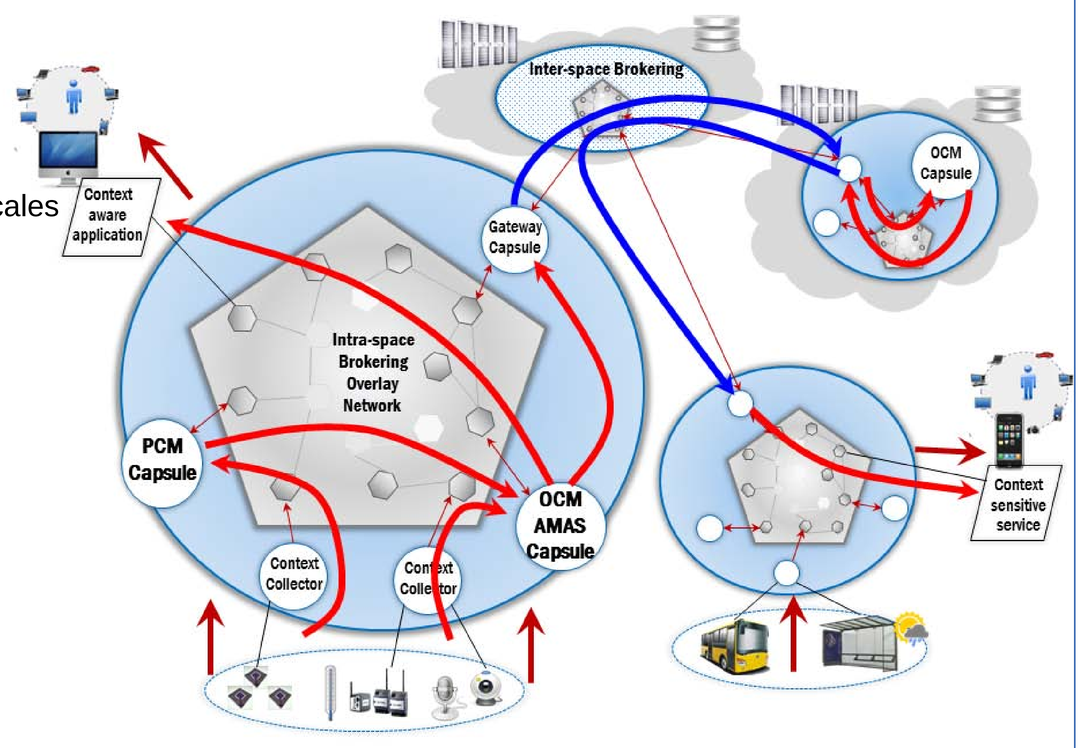
Functionalities

- Context data delivery, processing, and presentation

Extra-functionalities

- Quality of context and privacy protection

  ⇒ Rule-based filtering for controlling the distribution of context data



Monitoring and Reconfiguration of Cloud Resources

Authors

Mohamed Mohamed
Djamel Belaïd
Samir Tata

1. Context

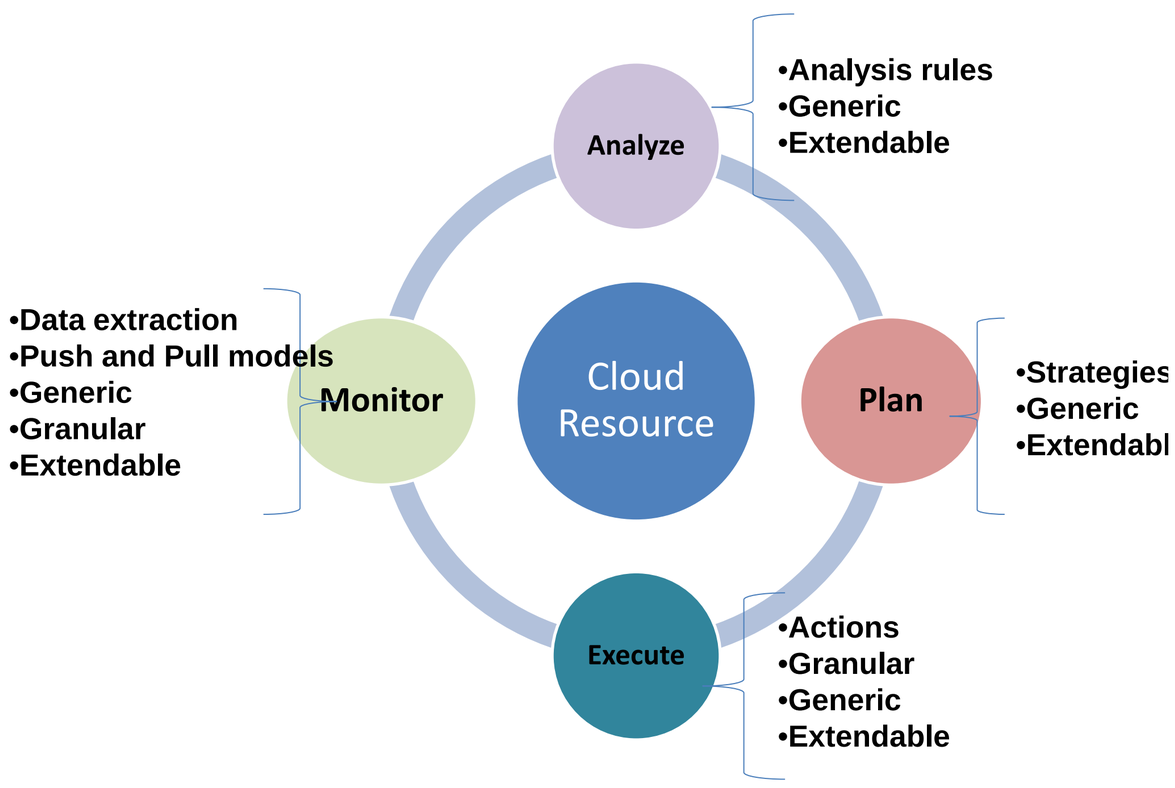
Cloud Computing environments:

- Massively scalable
- Dynamically configured
- Delivered on demand
- Heterogeneous resources

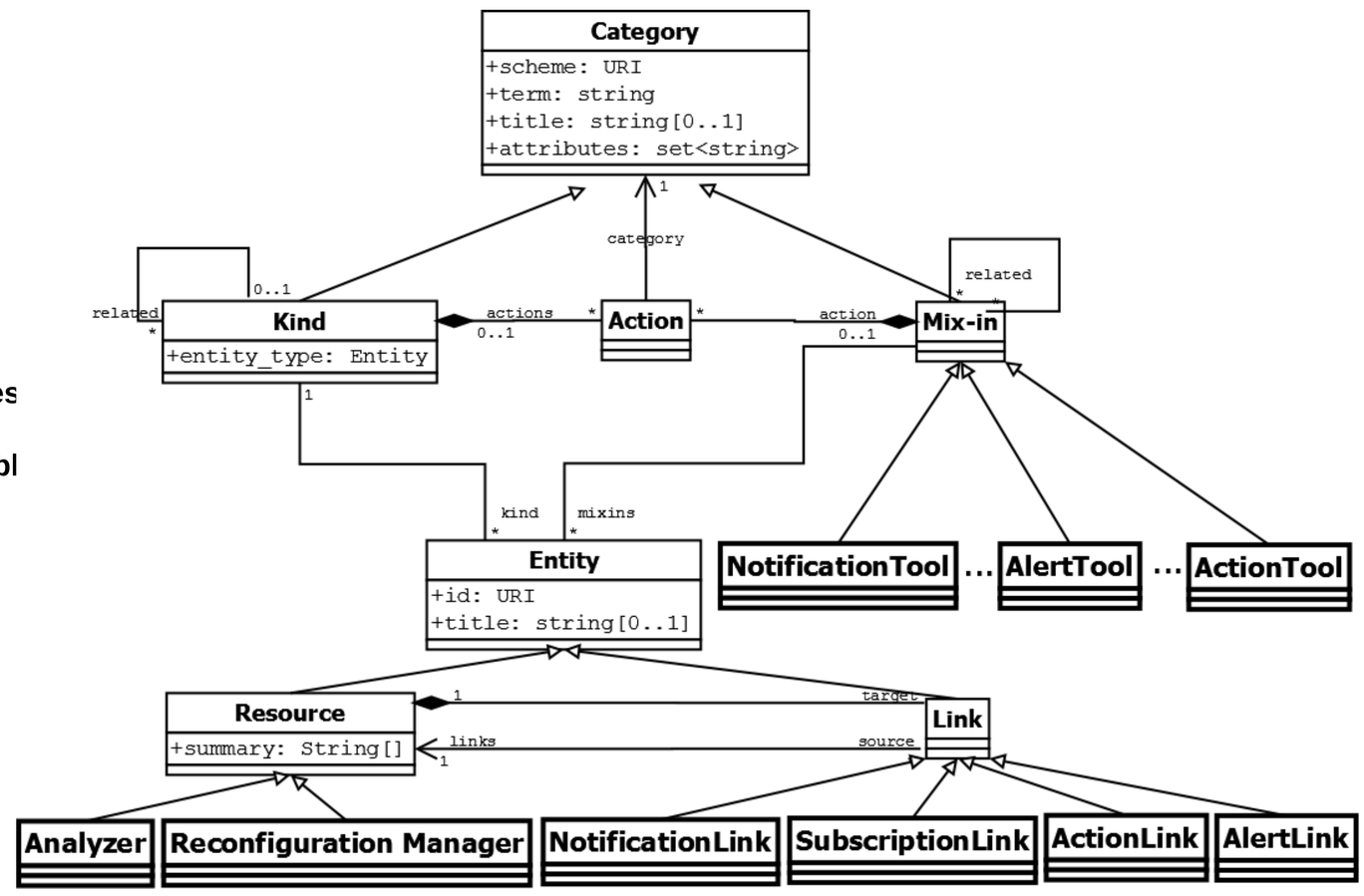
2. Objectives

- Define a model for a standard description of Monitoring and Reconfiguration requirements
- Generic Monitoring and Reconfiguration solution independent of the Cloud Service layer
- Extensible and granular solution

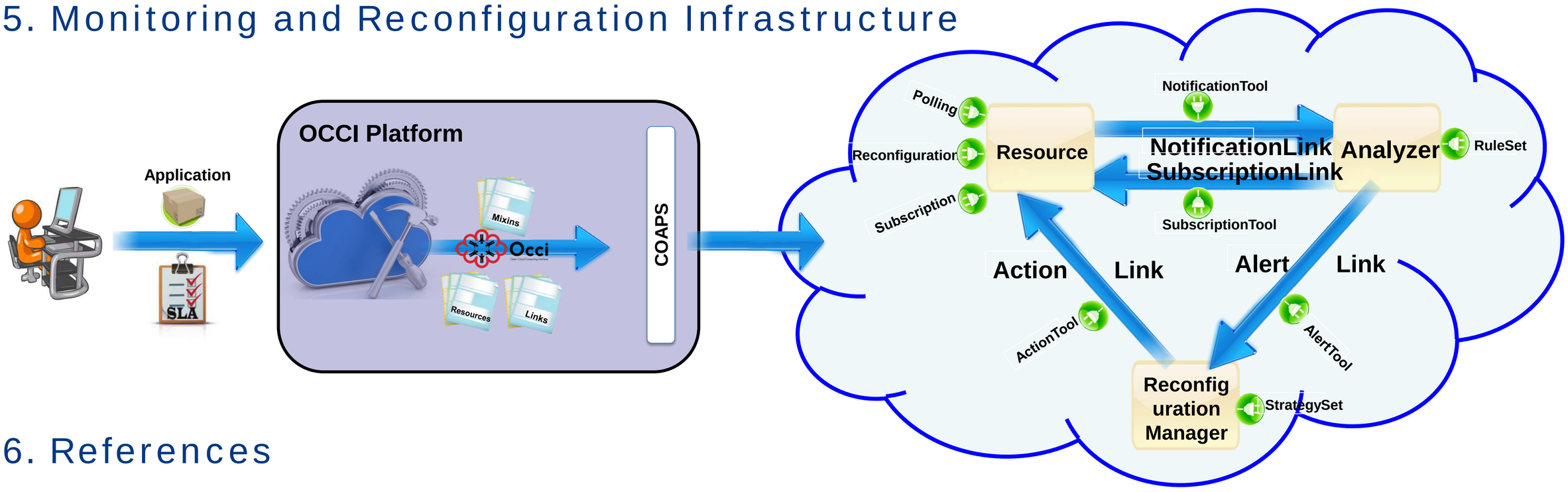
3. Monitoring and Reconfiguration requirements



4. OCCI defined Entities and Mixins



5. Monitoring and Reconfiguration Infrastructure



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- OCCI4Java Platform and Application, http://www-inf.telecom-sudparis.eu/SIMBAD/tools/OCCI/

Contact: { Mohamed.Mohamed, Djamel.Belaid, Samir.Tata } @telecom-sudparis.eu