Hybrid Joint-Transmission Multi-Point Coordination for Inter-Cell Interference Management

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***Abstract*—In wireless networks, the transmission efficiency is highly impacted by attenuations such as: path-loss, shadowing, multi-path fading and interference. At cell edges, mobiles are far from their access point and close to neighboring cells, leading to high path-loss and high magnitude of interference. Consequently, ensuring high spectral efficiency is necessary to guarantee an appropriate Quality of Service (QoS), especially at edges. To cope with this crucial issue, this work investigates the benefits of the Joint Transmission Coordinated Multi-Point (JT-CoMP) clustering to mitigate Inter Cell Interference (ICI). This paper proposes the Hybrid Joint-Transmission Coordinated MultiPoint algorithm (H-JT-CoMP). This solution dynamically performs its ICI management according to the Chanel State Information (CSI). This allows to make a wise CoMP usage according to the magnitude of interference received. Performance evaluation highlights an increased QoS and system capacity with a better fairness between inner and edges of the cell.**

***Index Terms*—Wireless Network, Coordinated MultiPoint, Interference management, Cell-less, Opportunistic Scheduling.**

I. Introduction

The ever-increasing needs in term of throughput, system capacity and delay requirements require to optimize transmission efficiency particularly in ultra dense networks. Phenomena like path-loss, shadowing, multi-path fading and interference significantly impact the transmission quality and complicate the task of radio resource allocation solutions.

In the intra-cell domain, user selection algorithms carry out the transmission efficiency optimization. Although this topic has been well investigated in the literature [1], these solutions are not designed to properly manage Inter-Cell Interference (ICI). Consequently, efficient intra-cell scheduler is not sufficient to provide a decent quality of service and ICI management is required.

One of the main challenges of ICI management solutions is to mitigate the interference while efficiently using the spectrum. Cell-edge mobiles are far from their access point and close to neighboring cells. Consequently, they have a poor Signal-to-Interference-and-Noise Ratio (SINR) due to the distance from their access point (high path loss) and the magnitude of interference received. This makes it difficult to meet their application requirements. Depending on the cell edge mobile management, performance provided by ICI management solutions can highly vary, particularly on the QoS metric. Classical ICI management solutions like Reuse 1 (R1) or Sliced Bandwidth (SB) [2] make cells to neglect interference or to limit the usage of their bandwidth.

The Reuse 1 scheme uses the completeness of the bandwidth without avoiding interference. Although all the available resources are used, the interference impact on the transmission efficiency is very significant, particularly at the edges. Inner cell mobiles receive weak magnitude of interference and their application requirements are easily met while cell edge mobiles are not protected from interference leading to a poor QoS. Thus, this solution is highly unfair between mobiles at the inner and edges of the cell.

To cope with interference, the Sliced Bandwidth solution (like Reuse 3) has been designed. The Sliced Bandwidth is the classical ICI avoidance scheme. It splits its bandwidth, allowing user selection solutions to allocate radio resources only on a part of the frequency domain. Mobiles are protected from interference (providing high spectral efficiency) but this induces a high bandwidth waste, leading to a poor system capacity.

In [3, 4], the Fractional Frequency Reuse (FFR) and Soft Frequency Reuse (SFR) solutions are presented. These classical approaches perform a Sliced Bandwidth strategy in cell edges while in inner cell, a Reuse 1 strategy is used. In addition, SFR solution provides different power levels between the inner cell and edges, leading to a better usage of the bandwidth. Though performance is increased compared to Reuse 1 and Sliced Bandwidth solutions, SFR and FFR schemes cannot adapt their behavior to the mobile distribution as frequencies allocated to each cell are fixed beforehand.

These classical solutions of the literature, attempt to solve a multi-cellular problem (i.e. ICI) in the intra-cellular domain. This leads to either sacrifice cell edge mobiles or either reducing the usage of the spectrum. Moreover, the ICI management performed by these solutions is fixed beforehand leading to a static behavior which can hardly adapt to the context and to wireless networks specificities. This results in poor flexibility inducing inefficient bandwidth usage.

Recently, an innovative approach named "Cell-less" has emerged. This approach considers the network as a "hyper-cell" rather than a sum of quite independent cells. This leads

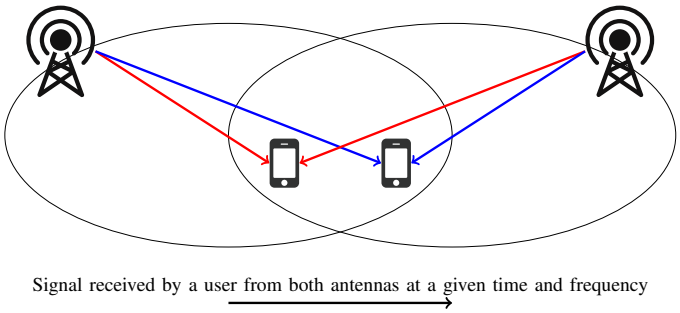


Fig. 1. Joint Transmission (JT) [5]

to global optimizations instead of a sum of local optimizations, which is much more efficient from the system point of view. By allowing a joint resource allocation and user data exchange among access points, the Cell-less approach enables the design of more dynamic solutions thanks to the cooperation between access points in order to solve issues previously described. In this context, the implementation of the Coordinated MultiPoint (CoMP) fits appropriately with a Cell-less approach. The CoMP has been introduced for Long Term Evolution Advanced (LTE-A) by the 3rd Generation Partnership (3GPP) [6] and is now considered as a key feature for 5G wireless networks to mitigate ICI [7]. This works focuses on the Joint Transmission CoMP (JT-CoMP) as it provides better performance than other type of CoMP [5, 8].

With the JT-CoMP (Fig.1), mobile data and scheduling information are shared between a cluster of access points. This allows a mobile to potentially receive a signal from many access points at the same time. Consequently, serving access points will need to jointly transmit the same user data and to reserve the same radio resource. This leads to mitigate ICI and to slightly increase throughput at the edges at the expense of higher radio resource consumption and signaling among access points.

In [9], a JT-CoMP clustering is proposed. In the following of the paper, this solution is referenced as Power Level Difference CoMP (PLDCoMP). The PLDCoMP selects the two strongest signals received by a mobile to define serving access points to perform CoMP. Then, it relies on a similar method presented in [10, 11], based on the Power Level Difference (PLD) value, to determine whether the signal powers are comparable. If they are, the mobile is in CoMP mode, else the mobile is in non-CoMP mode. Unlike previously described solutions, the PLDCoMP dynamically performs its ICI management by allocating resources to mobiles in non-CoMP and CoMP modes such as:

$$\begin{aligned} BW_{i,non-ComP} &= \frac{RUs}{(NC + (b \times CO))} \times NC \\ BW_{i,ComP} &= BW_{i,total} - BW_{i,non-CoMP} \end{aligned} \tag{1}$$

where $BW_{i,non-ComP}$ and $BW_{i,ComP}$ are the bandwidth allocated to the number of NC mobiles in non-CoMP mode and to the number of CO mobiles in CoMP mode, respectively. RUs is the number of available resources while b is a constant set to 0.25 to limit the usage of the bandwidth for mobiles in CoMP mode. Consequently, this solution makes a better bandwidth usage than previously described solutions and allocates resources depending on the number of mobiles in CoMP and non-CoMP modes. However, the b constant induces a restriction in the bandwidth usage for edge mobiles which provides them a poor Quality of Service. Although the PLDCoMP relies on a CoMP implementation with a Cell-less approach, this solution does not entirely take benefits from the flexibility provided by the CoMP.

In this paper, the Hybrid Joint Transmission Coordinated Multi-Point algorithm (H-JT-CoMP) is proposed. Its objectives are to provide a good system capacity by making a wise usage of the spectrum while efficiently decreasing interference received, leading to a QoS increased, even at edges. To achieve these goals, the H-JT-CoMP solution carries out its ICI management according to the CSI. The proposed solution performs either a Reuse 1 or either a CoMP strategy depending on the magnitude of interference potentially received by a mobile. Thus, the H-JT-CoMP solution cautiously uses the CoMP by taking benefits from the cell cooperation and data shared. This leads to efficiently mitigate the ICI while optimizing the usage of the radio resources.

This paper is organized as follow: section II describes the proposed solution and performance evaluation is explained in section III. This paper ends with the conclusion in section IV.

II. Hybrid Joint-Transmission Coordinated Multi-Point solution (H-JT-CoMP)

A. Channel model

In this study, the global available bandwidth is divided in sub-frequency bands called sub-carriers. The radio resources are distributed in the time domain in frames where each frame is divided in Time Slot (TS) of constant duration. A Resource Unit is defined as a pair (sub-carrier, time slot). The channel gain between the Remote Radio Head (RRH) i and the user k on the sub-carrier n is given by:

$$G^i_{k,n} = h\ 10^{\frac{X\sigma}{10}} \left(\frac{d_{ref}}{d_{k,i}}\right)^{\alpha} \tag{2}$$

where h represents the Rayleigh multi-path fading, which is modeled by an exponential distribution, X is a standard Gaussian random variable, σ is the standard derivation of shadowing in dB, d_{ref} is the reference distance, $d_{k,i}$ is the distance between mobile k and RRH i and α is path loss exponent. We denote the set of neighboring RRHs of the RRH i considered mapped to the Base Band Unit (BBU) of the H-JT-CoMP as C and the the cluster of serving cells for a mobile k in CoMP mode as C'. Let L and N be the number of element in set C and C', respectively. The SINR computation of user k on sub-carrier n associated to RRH i is given by:

$$\gamma^i_{k,n} = \frac{P^i_n G^i_{k,n}}{B_{sub} N_0 + \sum\limits_{(j=1, j\in C)}^{L} P^j_n G^j_{k,n}} \tag{3}$$

where parameters P^i_n and P^j_n are the the transmitted powers on sub-carrier n of RRH i and of the interfering RRH j belonging

to set C, respectively. Parameter N_0 is the thermal noise power density and parameter B_{sub} is the sub-carrier spacing [12]. To compute the spectral efficiency $\eta_{k,n}$ of mobile k on sub-carrier n associated to RRH i, the Shannon's formula is used such as:

$$\eta^i_{k,n} = \log_2(1 + \frac{\gamma^i_{k,n}}{\Gamma}) \tag{4}$$

where parameter Γ is a SNR correction factor that takes into account the difference between the information-theoretic performances and the practical implementation of the MCS [13] defined as follows:

$$\Gamma = -\frac{\ln(5E)}{1.5} \tag{5}$$

where E is a BER Target. The computation of spectral efficiency of a mobile in CoMP mode is defined such as:

$$\eta^{CoMP}_{k,n} = \log_2(1 + \sum_{(i=1, i\in C')}^{N} \frac{\gamma^i_{k,n}}{\Gamma}) \tag{6}$$

B. The proposed solution

The H-JT-CoMP clustering is based on a Cell-less approach. Consequently, it can manage several RRHs at the same time and aims to coordinate with the intra-cellular user selection. The mobile selected by the scheduling to transmit on the sub-carrier n in the RRH i, is denoted m_i. For instance, with a MaxSNR allocation, m_i is computed such as:

$$m_i = \underset{k}{\operatorname{argmax}}(\eta^i_{k,n}) \tag{7}$$

The proposed solution operates its ICI management after the user selection. When interference occurs, the H-JT-CoMP clustering performs either a JT-CoMP or a Reuse 1 strategy based on CSI according to this inequality :

$$\sum_{(i=1, i\in C)}^{L} \eta^i_{m_i, n_{interf}} \geq \max\left\{\eta^{CoMP}_{m_i,n}, \forall i \in C\right\} \tag{8}$$

The H-JT-CoMP clustering compares the sum of interfered radio conditions of all mobiles selected in the set of cell C with the maximal value of their radio conditions in CoMP mode. Based on this inequality, the proposed solution will perform a different ICI management strategy, defined such as:

$$\text{ICI Strategy} = \begin{cases} \text{Reuse 1} & \text{if Equation 8 is true} \\ \text{CoMP mode} & \text{else} \end{cases} \tag{9}$$

When H-JT-CoMP clustering uses a Reuse 1 strategy it means that radio conditions of mobiles selected by the intra-cellular scheduler are enough significant from the system point of view to let interference to occur while CoMP mode is favored when mobiles received important magnitude of interference. Thanks to this dynamic approach based on the CSI, the proposed solution optimizes the radio resource usage of the system while efficiently mitigating the ICI received. Moreover, no additional overhead is required as CSI is already computed by opportunistic intra-cellular schedulers (such as the MaxSNR) and cell coordination is performed by optical fibers. This provides an increase in system capacity and spectral efficiency, a better fairness between mobiles at inner and edges of the cell leading to an overall increase in the QoS.

C. Operation mode

The figure 2 illustrates some previously described solutions. For this example, a cluster of two cells is considered with their associated frames, respectively i and j. The user selection algorithm is a MaxSNR allocation. RUs are allocated TS per TS and denoted by (sub-carrier, time slot). Three mobiles are associated to each cell and are embodied by a specific color. In the RRH i, blue and red mobiles are at inner of the cell, while green mobile is at edge. In the RRH j, brown and orange mobiles are at inner of the cell, while purple mobile is at edge. The rate of color filling in each frame, illustrates spectral efficiency variations regarding interference received. Mobiles have different needs in term of application requirements which leads to different number of RUs required to end the transmission between the mobiles. For instance, the red mobile has the most packets to transmit.

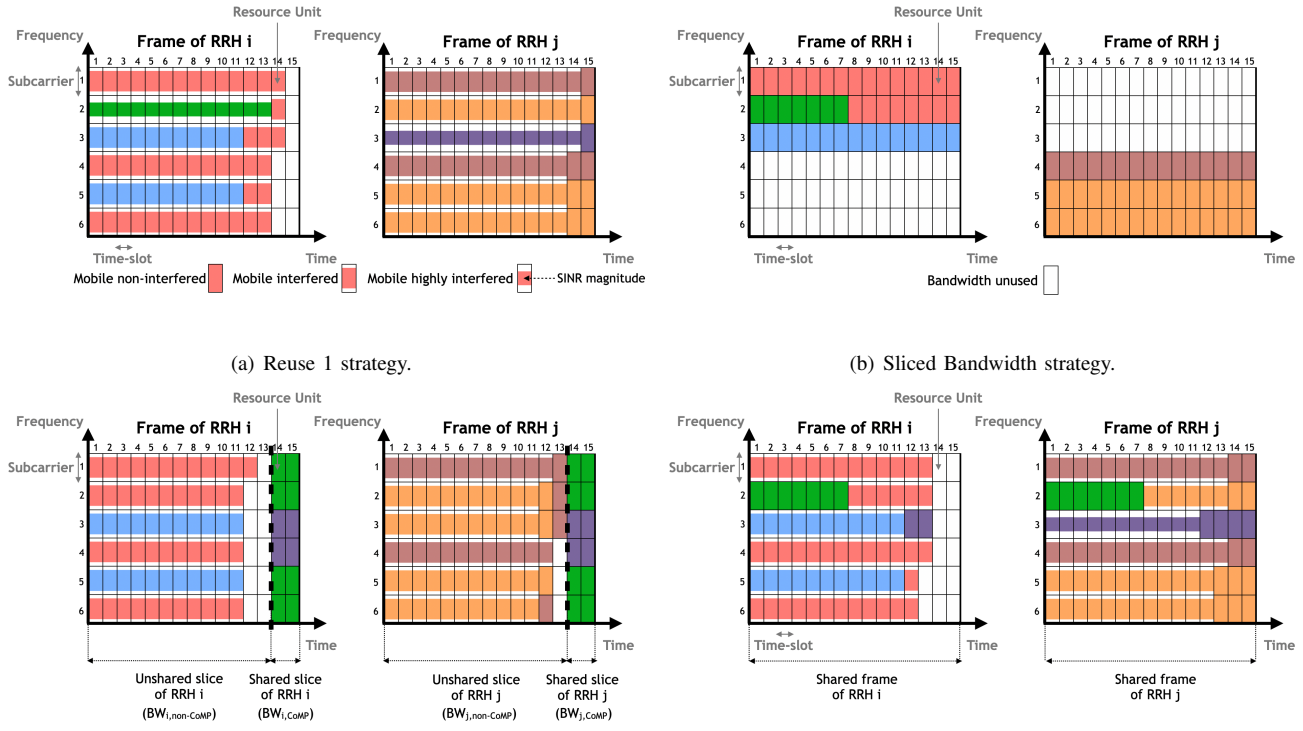
In the figure 2(a), the Reuse 1 operation mode is presented. As this solution allows interference to occur, mobiles at inner of cells have a decent spectral efficiency while edge mobiles (green and purple) are highly impacted by interference. Note that the purple mobile is not interfered on the RU (3,15) as nobody is transmitting on this RU in the RRH i.

The figure 2(b) introduces the Sliced Bandwidth strategy. As a cluster of 2 cells is considered, this solution splits its bandwidth into two parts. This allows to avoid interference at the expense of high bandwidth waste. In addition, the purple mobile in frame j, has not been selected by the MaxSNR allocation and cannot transmit during this frame.

In the figure 2(c), the PLDCoMP strategy is presented. Green and purple mobiles are at edges, they are considered in CoMP mode, while others are in non-CoMP mode. In this example (Fig.2), in each cell 90 RUs are available (15*6) and 1 mobile is in CoMP mode while 2 mobiles are in non-CoMP mode. According to the equation 1, the number of RUs allocated to mobiles in non-CoMP mode is 80 while only 10 RUs are allocated to CoMP mode mobile[1]. Consequently, the PLDCoMP hardly restricts the usage of the bandwidth to edge mobiles (green and purple). Note that with a JT-CoMP, a same RU in both RRH is reserved for a given mobile. For instance, on RU (1,14) in frame i and j the RU is allocated to the green mobile.

The figure 2(d) illustrates the H-JT-CoMP operation mode. The ICI management is performed for each RU. As the green mobile is highly interfered on sub-carrier 2 by the RRH j which transmits to orange mobile, the H-JT-CoMP put the green mobile in CoMP mode. On sub-carrier 3, purple and blue mobiles have enough significant radio conditions to be let in

[1]For presentation matters, the bandwidth is split by time slot. In the figure 2(c), the PLDCoMP allocates 12 RUs to edge user instead of 10



(a) Reuse 1 strategy.

(b) Sliced Bandwidth strategy.

(c) PLDCoMP strategy.

(d) H-JT-CoMP strategy.

Fig. 2. Interference management solutions with a MaxSNR allocation.

Reuse 1. When the blue mobile end its transmission (after TS number 11), the red mobile is able to transmit on sub-carrier 3. This time, the SINR of purple and red mobiles are poor which induces a CoMP mode for purple mobile on RUs (3,12) and (3,13). Thus, the HT-CoMP performs a more accurate ICI management, allowing to efficiently mitigate interference while optimizing the spectrum usage. This leads to protect cell edge users when the magnitude of interference received is too high, increasing their QoS.

III. Performances Evaluation

Parameters	Value
Cell Radius	500 m
Number of sub-carriers	32
Number of Time Slots	10
RRH transmit power	20 W (43 dBm)
Standard deviation of shadowing	σ = 8 dB
Path-loss exponent (α)	3.5 (urban context)
Target BER	5×10^{-5}
Sub-carrier spacing	15 kHz
Thermal noise power density (N_0)	- 174 dBm/Hz
Simulation duration	500 000 frames

TABLE I
Simulations parameters.

In the simulation, a network of two adjacent cells is considered. According to section II-A, $L = 1$ and $N = 2$. The proposed solution is compared to the classical ICI schemes, respectively Reuse 1 (R1) and Sliced Bandwidth (SB) solutions, as well as to the PLDCoMP clustering. The intra-cellular user selection solution used in both cells is a MaxSNR allocation for its ability to increase the system capacity and as it is one of the most acknowledged scheduler [1]. The traffic generated by sources is considered realistic and variable which produces high volume of data with important sporadic and tight delay requirements [14, 15]. This significantly complicates the task of resource allocation schemes. Simulations parameters are described in the table I.

In sections III-B and III-C, two deployments scenarii are provided. The first scenario is a proof of concept. Considering the MaxSNR unfair behavior regarding the distance of mobiles from their access point, mobiles are at the same distance from their access point. Users are split into two groups : the first is far from the neighboring cell and is likely not interfered. The second group is close to the neighboring cell and receive high magnitude of interference. This scenario allows to study the behavior of each solution in a simple context.

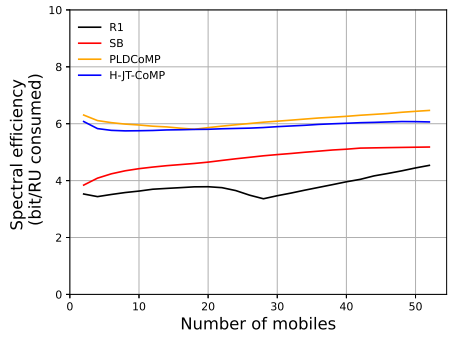
In the last scenario, users are uniformly distributed inside cells and solutions are studied for a given traffic load, when all solutions are close to congestion to let appear some packet delay.

A. Studied KPIs

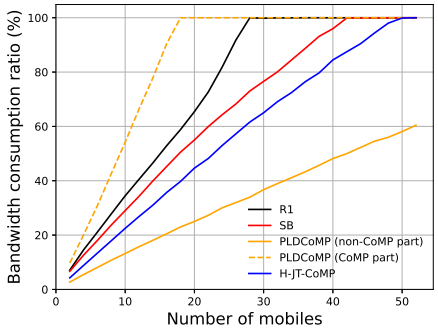
This work focuses on four Key Performance Indicators (KPIs) to evaluate the performance of each solution:

The bandwidth consumption ratio is the ratio between the number of RUs used by a solution and the total number of RUs available. When this ratio is equal to 100% it means that the system is congested.

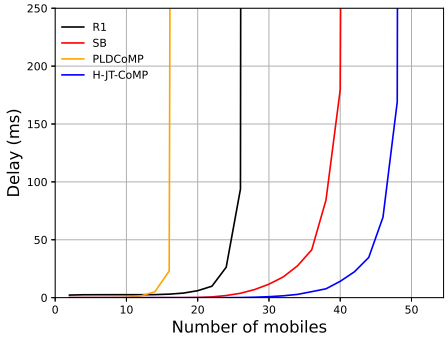
The spectral efficiency is the mean number of bits received on each RU used. In this work, the spectral efficiency takes into account both cells and is computed as the mean number of bits on each RU consumed. Computing the spectral efficiency



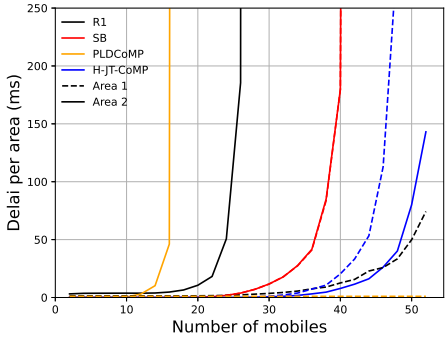
(a) Spectral efficiency.



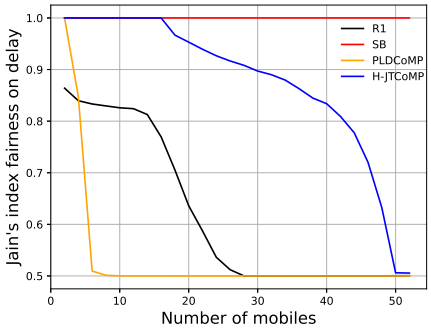
(b) Bandwidth consumption.



(c) Mean packet delay.



(d) Mean packet delay per area.



(e) Jain's index fairness on packet delay.

Fig. 3. Scenario 1.

only on RUs allocated is misleading because it does not take into account RUs unused to avoid interference (like SB). For instance, given a mobile with a $\eta_{m,n}$ equals to 14 with a SB strategy (avoiding ICI), its classical spectral efficiency is 14 (as only 1 RU is used) while its spectral efficiency (bits/RUs consumed) used in this work is 7 (as 2 RUs are consumed : one for transmitting and one for avoiding ICI). This provides a more accurate indicator on the bandwidth waste.

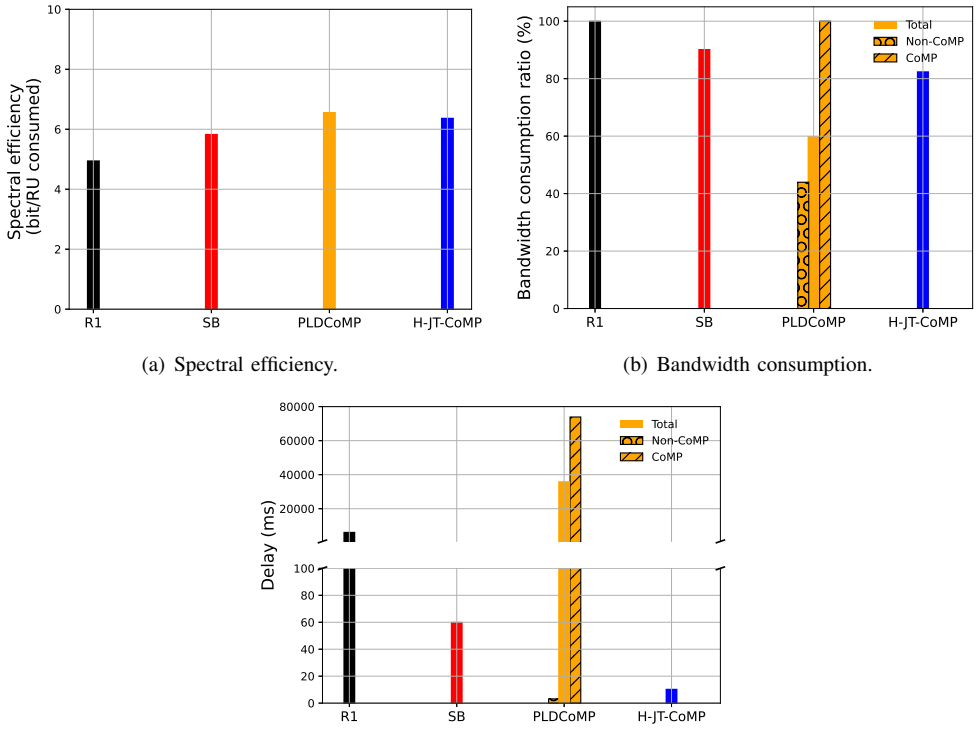
The mean packet delay is the mean delay to transmit one packet.

The QoS fairness index corresponds to the Jain's index fairness on delay. In this work, this KPI is only provided for scenario 1.

B. Scenario 1 : Proof of concept

In this scenario, mobiles are split into two groups. One group is far from neighboring cell and is likely not interfered. This position is referenced as area 1. The second group is close to neighboring cell and receives high magnitude of interference. This position is referenced as area 2. To neglect the unfair behavior of MaxSNR regarding the distance, mobiles are at the same distance (500m) from their access points regardless their group. Mobiles are added in each cell two by two (one per area). This scenario studies the performance of each solutions according to the traffic load increase.

The figure 3(a) shows the spectral efficiency of each solution. The Sliced Bandwidth strategy avoids interference and has a typical MaxSNR allocation behavior, taking benefits from the multi-user diversity which increases spectral efficiency as the traffic load rises. Unlike this solution, the Reuse 1 lets interference to occur. From 2 users to 20, its takes benefits from the multi-user diversity. At a traffic load of 22 users, the number of RUs without interference is decreasing



(a) Spectral efficiency.

(b) Bandwidth consumption.

(c) Mean packet delay.

Fig. 4. Scenario 2.

as well as the spectral efficiency, highlighting that the system is close to be congested. At 28 users, all RUs are interfered and the magnitude of interference has reached its peak. The system is congested since the bandwidth consumption ratio of the R1 solution reached 100% (Fig.3(b)). Then, the MaxSNR behavior counterbalances ICI effect by taking benefits from the multi-user diversity. This leads to increase the spectral efficiency after the system congestion. Concerning solutions performing CoMP, PLDCoMP and H-JT-CoMP, their spectral efficiencies decrease at the beginning, as the number of RUs interfered rises. Indeed, this spectral efficiency takes into account the RUs consumed. As these solutions use CoMP to mitigate ICI, they consume more RUs (2 RUs reserved for the same user due to the JT-CoMP). However, the PLDCoMP splits its bandwidth into 2 parts : one for mobiles in CoMP mode and the other for mobiles in non-CoMP mode. This induces there is never a mobile interfered (area 2) and a mobile non-interfered (area 1) scheduled at the same time and on the same frequency. This avoids the situation where the mobile interfered has a poor SINR while the mobile non-interfered has a great SNR. Consequently, this provides a great spectral efficiency. Note that at a traffic load of 18 mobiles, the bandwidth allocated to mobiles in CoMP mode is congested (Fig3(b), Equation.1). As the PLDCoMP cannot serve more mobiles in CoMP mode while there are RUs available for mobiles in non-CoMP mode, the spectral efficiency increases. Indeed, non-CoMP mode mobiles which are not interfered (i.e. have better radio conditions), will be more important in the spectral efficiency computation than CoMP mode mobiles. The H-JT-CoMP clustering provides a spectral efficiency close to PLDCoMP solution results. Considering that the proposed solution does not segregate mobile depending on their position neither limiting their bandwidth usage, the H-JT-CoMP provides also a great spectral efficiency.

The figure 3(b) shows the bandwidth consumption ratio of each solution. According to the spectral efficiency (Fig.3(a)), the R1 strategy is the first to provide a congested system, then the SB scheme and the H-JT-CoMP solution. Concerning the PLDCoMP, after 50 users in the system, this solution has still RUs available but only for mobile in non-CoMP mode since its bandwidth part allocated to CoMP mode mobile is overloaded since a while (18 mobiles).

Figures 3(c), 3(d) and 3(e) illustrate the mean packet delay, the mean packet delay per area and the Jain's index fairness on delay, respectively. This last metric is computed with the mean packet delay of each group. This induces the limit value to be equal to 0,5. Due to its poor spectral efficiency and system capacity, the Reuse 1 solution provides a poor QoS to mobiles. In addition, using Reuse 1 strategy to manage interference is highly unfair (Fig.3(e)) regarding the mobile position. In this way, even if mobiles less interfered (area 1) have a decent QoS, mobiles in area 2 receive high magnitude of interference which leads to a poor QoS. The Sliced bandwidth, thanks to a better spectral efficiency, provides a better QoS than R1 solution. Its ICI avoidance scheme allows, in this context, to have a perfect fairness among mobiles (Fig.3(e)). Nevertheless, it induces a high bandwidth waste. The system capacity is limited and the mean packet delay of mobiles rises quickly. The PLDCoMP

solution provides a poor QoS to users due to the inequality of resources available between mobiles in non-COMP mode and CoMP mode. Thus, the CoMP part is quickly overloaded (Fig.3(b)) leading to a poor QoS for mobile in CoMP mode (Figs.3(d),3(e)). The H-JT-CoMP solution outperforms other solutions on this KPI. Thanks to a wise ICI management, interference received at edges are mitigated while the spectrum is efficiently used (Fig.3(b)). This leads to increase the QoS of users (Fig.3(c)), even for the most interfered. As mobiles in area 2 are closer to neighboring cell than mobiles in area 1, the CoMP is much more efficient for them. According to the equation 8, if a mobile in area 1 (less interfered) and a mobile in area 2 (more interfered) are selected respectively on RRHs i and j to transmit with CoMP, the H-JT-CoMP will favor the mobile in area 2. This explains that mobiles in area 2 have a better QoS than mobiles in area 1 (Fig.3(d)). However, the H-JT-CoMP provides a decent fairness between the two groups of mobiles (Fig.3(e)).

C. Scenario 2 : Uniform distribution

In this scenario, users are uniformly distributed in cells. Solution performances are studied for the same fixed traffic load where all solutions are experiencing difficulties to ensure mobile application requirements. This allows to let appear delay on packets in order to compare solutions. In this context, mobiles are at different positions. Consequently, mobiles at edges are impacted both by a high magnitude of interference received and the unfair behavior of MaxSNR allocation regarding the distance from the access point. Note that since Reuse 1 and the CoMP part of PLDCoMP solution are congested, the mean packet delay depends on the simulation duration. In addition, for the PLDCoMP solution, mean packet delay and bandwidth usage ratio are also given depending on the mobile modes in order to explain the behavior of this solution.

According to results in the scenario 1, the R1 strategy provides a weak spectral efficiency to the system (Fig.4(a)) leading to a poor system capacity (Fig.4(b)). Thus, the QoS of mobiles is highly degraded (Fig.4(c)). The SB solution thanks to its ICI avoidance provides a decent spectral efficiency (Fig.4(a)) leading to increase the QoS of mobiles compared to Reuse 1 solution (Fig.4(c)). The PLDCoMP, is unfair regarding the mode of mobiles. This induces a poor number of resource available for mobiles in CoMP mode (Fig.4(b)) and a poor QoS, especially for CoMP-mode mobiles (Fig.4(c)). The proposed solution provides a spectral efficiency close to PLDCoMP performance (Fig.4(a)) thanks to its ICI management based on CSI. This leads to increase the system capacity (Fig.4(b)) and to outperform other solutions on delay metric by highly increasing QoS of mobiles (Fig.4(c)).

IV. Conclusion

The contribution of this paper, Hybrid Joint-Transmission Coordinated MultiPoint clustering (H-JT-CoMP) performs its ICI management to mitigate interference at edges while efficiently optimizing spectrum usage. In order to reduce interference at edges, it relies on the Joint-Transmission CoMP. For each Resource Unit, the proposed solution dynamically performs either a Reuse 1 or either a JT-CoMP strategy according to the Channel State Information and the magnitude of interference received. Performance evaluations emphasizes this solution increases the spectral efficiency and system capacity while efficiently reducing interference. This leads to a QoS increased and a better fairness between users at inner and edges of cells.

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