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# A Bidding Algorithm for Heightened Efficiency-Constructed Source Distribution in MANET

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***Abstract – this paper we propose and evaluate a combined routing, admission control and source distribution scheme that aims to maximize the aggregated efficiency of the system. As part of this scheme, two novel efficiency-constructed algorithms are presented. The core of the scheme is a distributed, price-constructed distribution algorithm that allocates bandwidth to flows using only locally available information. A complementary price-constructed routing algorithm for choosing the most advantageous path for the flows is also proposed. In my work, however, the routing algorithm is part of the global distribution optimization scheme. The core of the scheme is a distributed price-constructed distribution algorithm that allocates bandwidth to flows using only locally available information. A complementary price-constructed routing algorithm for choosing the most advantageous path for the flows is also proposed. We start by formulating the distribution problem as a linear programming maximization problem. To properly divide the shared channel in an ad hoc setting, we use the concept of clique source. It allows gathering mutually interfering links in partially overlapping maximal cliques. The cliques deterministically account for bandwidth capacity and act as source s in the LP problem. We then propose a distributed low-complexity distribution algorithm that uses the concept of source shadow price. The novelty is that the algorithm employs an auction mechanism, where flows are bidding for source s. The bids depend both on the flow's efficiency function and the intrinsically derived shadow prices. We present two versions of the distribution scheme.***

***Keywords: Mobile computing, Independent Clique Construction, Distribution, Application Efficiency, performance evaluation of algorithms and topology-related algorithms.***

## I. Introduction

Mobile manet are formed by wireless nodes that move freely and have no fixed infrastructure. Each node in the network may act as a router for other nodes, and flows follow a multihop path from source to destination. The infrastructure-less flexibility makes manet a strong complement to cellular networks, and ideal for many novel scenarios such as cooperative information sharing, defense applications, and disaster management. Mobile manet will support a wide range of services in which soft real-time (multimedia) and high-priority critical data seamlessly integrate. As society becomes dependable on the provision of such services, their availability under overloads becomes a critical issue.

Existing System:

Work in source distribution for ad hoc wireless networks has been addressed either at the MAC level, as an extension to routing, or at an optimization policy level. Bandwidth availability in manet can be either pre computed or measured at MAC level. To compute the available bandwidth at a node as the channel bandwidth minus the bandwidth consumed by the traffic at all neighbors. While easy to implement, this is too pessimistic, and better models can be created when interference structures are built constructed on link interference. In this work, we use the contention model constructed on maximal cliques of contending links. If no global optimization is sought, source distribution can be attempted independently at every node by appropriate MAC layer design. The present a packet scheduling approach to ensure a minimum weighted-fair scheduling combined with maximizing spatial reuse of channel. In several earlier works, source distribution/reservation is treated as an extension of the routing protocol. For instance propose an on-demand distributed routing algorithm that aims to avoid flooding the network. They consider delay and bandwidth constrained least cost problems. The feature of the "bandwidth routing" protocol is that link-layer scheduling is directly considered in the protocol.

Proposed System:

In my work, however, the routing algorithm is part of the global distribution optimization scheme. The contributions of this project are as follows: I propose and evaluate a combined routing, admission control, and source distribution scheme that aims to maximize the aggregated efficiency of the system. As part of this scheme, two novel efficiency-constructed algorithms are presented. The core of the scheme is a distributed, QoS-aware, price-constructed distribution algorithm that allocates bandwidth to flows using only locally available information. A complementary price-constructed routing algorithm for choosing the most advantageous path for the flows is also proposed. We start by formulating the distribution problem as a linear programming (LP) maximization problem. To properly divide the shared channel in an ad hoc setting, we use the concept of clique source. It allows gathering mutually interfering links in partially overlapping maximal cliques. The cliques deterministically account for bandwidth capacity and act as sources in the LP problem. We then propose a distributed low-complexity distribution algorithm that uses the concept of source shadow price, borrowed from the dual LP problem.

## II. SYSTEM OVERVIEW

A wireless ad-hoc network consists of a collection of wireless nodes without a fixed infrastructure. Each node in the network forwards packets for its peer nodes, and each end-to-end flow traverses multiple hops of wireless links from a source to a destination. Compared with wire line networks where flows only contend at the router that performs flow scheduling (contention in the time domain), the unique characteristics of multi-hop wireless networks show that flows also compete for shared channel if they are within the interference ranges of each other (contention in the spatial domain). This presents the problem of designing a topology-aware source distribution algorithm that is both optimal with respect to source utilization and fair across contending multi-hop flows.

The shared channel is modeled as a bandwidth source defined by maximal cliques of mutual interfering links.The infrastructure-less flexibility makes manet a strong complement to cellular networks, and ideal for many novel scenarios such as cooperative information sharing, defense applications, and disaster management. Mobile ad-hoc networks will support a wide range of services in which soft real-time (multimedia) and high-priority critical data seamlessly integrate. As society becomes dependable on the provision of such services, their availability under overloads becomes a critical issue. In comparison to wire line networks, wireless multihop networks will always be more source constrained due to several fundamental differences. The first major issue is the limited spectrum of the locally shared communication channel. Neighboring nodes can interfere and cannot transmit independently.

### (a)Distributed source distribution:

A system that addresses source distribution in a wireless/wire line access network is the “TIMELY architecture”[2].termination credit, adaptation credit, and an admission fee), where the same instance of the 4-tuple is used globally. While simplifying distribution, this prevents an accurate differentiation between flows. During recent years, several works have addressed the problem of maximizing network efficiency and have proposed distributed approaches to achieve. To our knowledge, they all derive their solution from a decomposition method presented in the seminal work and solved by employing GPA and sub gradient projection algorithm. For the remainder of this section, we continue discussing characteristics and examples of this class. Like this approach, these works also use concave efficiency functions and aim to maximize the aggregated efficiency of the flows in the network. However, there are some fundamental differences between the two approaches. The GPA class formulation works only with twice differentiable continuous functions, while our formulation works with piecewise linear ones .

### (b)Independent Distribution

After all the bids have been placed, every clique source independently allocates the bandwidth to the sub flows in decreasing order of bids until bandwidth is depleted. Then, the new shadow price of the source is set to the price of the lowest bid among the accepted sub flows. Note that all the bandwidth is reallocated, and some sub flows might get, this time, an distribution different from last period. If contention at a certain source is greater than during the previous distribution, its price will increase. If some subflow’s bid cannot accommodate this increase, the subflow will be rejected. If contention decreases, the price of a source will decrease. This means that some sub flows that bid less than the previous shadow price (i.e., have a negative price slack) are accepted, bringing the price down accordingly. If a source does not allocate all its bandwidth, it is under loaded and its shadow price becomes zero.

To explain how this bandwidth distribution scheme works, we must first present the notion of bandwidth dependent efficiency function and a efficiency maximization algorithm.

### (c)The Distributed Distribution Algorithm

If the real shadow prices were known, perfect bids could be constructed. In such a case, a sub flow would consistently be accepted or rejected at all the cliques that it traverses. As we do not know the new shadow price beforehand, we use the shadow price from the last distribution as an estimate. At a certain clique source, the new price could become higher than the bids of some flows (i.e., the new contention level was underestimated at bid construction). In such a case, some flows that with hindsight could have offered a proper bid are rejected. Conversely, overestimating a source price unnecessarily increases its bid to the detriment of bids for other sources.

As a consequence of over/underestimation, the allocated bandwidth could be different at different clique sources, and the flow can use only the minimum distribution over the end-to-end path. Hence, one could use several consecutive iterations of the algorithm to better balance the bids. Nevertheless, as the algorithm is intended for online distribution we use only one iteration per redistribution period, and any misallocated bandwidth will remain unused for that period. Since during an optimal distribution the amount of this misallocated bandwidth is zero, in my experiments, we use the misallocated bandwidth as another measure of how close to optimal distribution the performance of our algorithm is.presents a pseudo code of the two parts of the distributed algorithm that run synchronously at every clique source and at every node, respectively. For every clique source, a clique-leader node, which is used to perform the (re)distribution computations, is determined at clique-construction time.

The clique leader gathers information about the flows using the clique source and then runs the distribution algorithm. Whenever a flow starts/stops using a wireless link, the link's end-node closer to the clique leader registers/ deregisters the flow with the clique leader. This applies to all cliques containing the given link. The clique leader can be chosen such that the distance to the end-nodes of the links belonging to the clique is at most two hops away. Therefore, inside-clique signaling could use the MAC layer signaling (e.g., piggyback RTS, CTS, and ACK packets).

The natural place for running the flow-adaptation part of the algorithm (i.e., adjusting transmission rate to the new distribution) is at the flow's source node. Note also that the signaling information between clique sources and the source nodes of the flows is sent only along established routes, and thus can be piggybacked on existing packets. Packets belonging to any flow using a link in the clique will pass through a node that is at most two hops away from the clique leader (with which it communicates using in clique signaling).

Clique selection

Wireless sensor networks, as well as other ad-hoc systems that network energy-limited nodes, have different constraints than wired networks,and necessarily place more emphasis on some characteristics while simultaneously compromising in other areas. For example, unlike in wired networks, it is neither possible (nor, often, desirable) for a node to completely seize the channel source. Wireless networking often involves nodes with significant energy consumption constraints. For this reason, a prominent difference between wired and wireless nets is that latency, throughput, and bandwidth efficiency are often traded for energy efficiency in the latter. MAC (media access control) protocols for wireless manet must balance a large number of conflicting goals.

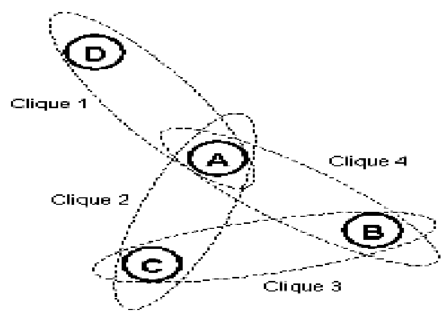


**Fig.1.Wireless sensor networks for ad-hoc systems**

## III. THE WORKING PRINCIPLE

This paper proposes a scheme for bandwidth allocation in wireless ad hoc networks. The quality-of-service (QoS) levels for each end-to-end flow are expressed using a resource-utility function, and our algorithms aim to maximize aggregated utility. The shared channel is modeled as a bandwidth resource defined by maximal cliques of mutual interfering links. We propose a novel resource allocation algorithm that employs an auction mechanism in which flows are bidding for resources. Mobile ad hoc networks are formed by wireless nodes that move freely and have no fixed infrastructure. Each node in the network may act as a router for other nodes, and flows follow a multihop path from source to destination. The infrastructure-less flexibility makes ad hoc networks a strong complement to cellular networks, and ideal for many novel scenarios such as cooperative information sharing, defense applications, and disaster management. Mobile ad hoc networks will support a wide range of services in which soft real-time (multimedia) and high-priority critical data seamlessly integrate. As society becomes dependable on the provision of such services, their availability under overloads becomes a critical issue. In comparison to wire line networks, wireless multihop networks will always be more resource constrained due to several fundamental differences. The first major issue is the limited spectrum of the locally shared communication channel. Neighboring nodes can interfere and cannot transmit independently.

propose and evaluate a combined routing, admission control, and resource allocation scheme that aims to maximize the aggregated utility of the system. As part of this scheme, two novel utility-based algorithms are presented. The core of the scheme is a distributed, QoS-aware, price-based allocation algorithm that allocates bandwidth to flows using only locally available information. A complementary price-based routing algorithm for choosing the most advantageous path for the flows is also proposed. We start by formulating the allocation problem as a linear programming (LP) maximization problem. To properly divide the shared channel in an ad hoc setting, we use the concept of clique resource. It allows gathering mutually interfering links in partially overlapping maximal cliques.

**Bid construction:**

In this module we compute the sources to utilize efficiency. A subflow needs to be accepted at all the traversed sources in order to be established. We assume that the contention level of a source will not abruptly change from one period to the next, so we start with a preliminary bid equal to the price of the source in the previous. Now, we add all these preliminary bids, we end up with the path price. Through the number of sources used by a flow compute maximum budget.

**Independent Distribution:**

After all the bids have been placed, compute all the bids, then every clique source independently allocates the bandwidth to the subflows in decreasing order of bids until bandwidth is depleted. Then, the new price of the source is set to the price of the lowest bid among the accepted subflows. Choose the lowest bids, Allocate source to lowest bid.

**Distributed Source Distribution :**

The ad hoc network considered is an open dynamic system where source request and availability are always changing. Therefore, our scheme employs periodic redistributions to keep the source usage heightened. As end to end connections span several nodes and clique sources, it is important that distributions are well coordinated along the path. Every flow calculates a bid for all clique sources it traverses, constructed on their associated shadow prices. Each clique source independently evaluates the bids, proposes a certain bandwidth distribution to the flow, and recalculates its shadow price. The flow chooses the lowest bandwidth proposal from all the cliques it traverses as the new bandwidth for the new period.

**Clique Construction** :

Due to mobility, a node might enter or exit the communication range of another one, thus creating a new wireless link, or alternatively breaking one. Discovery of topology changes can be implemented only local information is needed to construct the maximal cliques. if all nodes send their neighborhood list three hops away, every node will be able to identify all the cliques containing any adjacent link. And the topology is Updated, Recreating the network cliques.

## IV. IMPLEMENTATION OF SYSTEM

**Code for Bid construction:**

```
import java.util.*;
public class DisBidValues
{
int pathprice[] = new int[g.nodes];
for(int j=0;j<g.nodes;j++)
{
if(graphmat[i][j]!=0)
{
str += " Node ";
str+= (j+1);
pathprice[i] += graphmat[i][j];
}
}
str +="    Path Price: " + pathprice[i];
int budget[] = new int[g.nodes];
Random rand = new Random();
: " + i + " : " + budget[i];
}
for(int i=0;i<g.nodes;i++)
{
+= budget[i];
}
for(int i=0;i<g.nodes;i++)
{
totalslack += slack[i];
}
str += "Slack Price: " + (totalbudget - totalslack);
for(int i=0;i<g.nodes;i++)
{
str += "New Bids for Node: " + i + " : " + (budget[i]+((totalbudget -  totalslack)/g.nodes));
}
```

**Code for Independent Distribution:**

```
for(int i=0;i<g.nodes;i++)
{
budget[i] = Math.abs(rand.nextInt()) % 100;
```

```
str += "Budget for Node: " + i + " : " + budget[i];
slack[i] = (budget[i]-pathprice[i]);
str += "Slack Price for Node: " + i + " : " + slack[i];
graph.insertVertex(parent, null, "Node:"+(i+1) +"\n Budget:"+budget[i]+"\n Slack  Price:"+slack[i] +"\n New Bid:"+(budget[i]+((totalbudget - totalslack)/g.nodes))
}                for(int i=0;i<g.nodes;i++)
{
for(int j=0;j<g.nodes;j++)
{
if(graphmat[i][j]!=0)
{
graph.insertEdge(parent, null, ""+graphmat[i][j], v[i], v[j]);
}
```

**Code for Distributed Source Distribution**

```
Import java.util .ArrayList;
public class DistributedAlgorithm
{
for(int i=0;i<g.nodes;i++)
{
v[i] = graph.insertVertex("Source\n Distribution:\n"+(budget[i]+((totalbudget - totalslack)/g.nodes)+"/256");
}
for(int i=0;i<g.nodes;i++)
{
for(int j=0;j<g.nodes;j++)
if(graphmat[i][j]!=0)
{
graph.insertEdge(parent, null, ""+graphmat[i][j], v[i], v[j]);
}
```

V.EXPERIMENTAL RESULTS

The concept of this paper is implemented and different results are shown below.

**V.EXPERIMENTAL RESULTS**

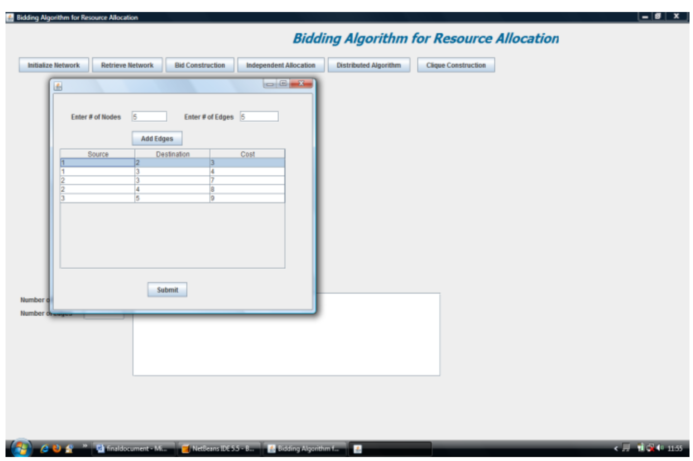


**Fig2.**:Screenshots for Entering number of Nodes and Edges

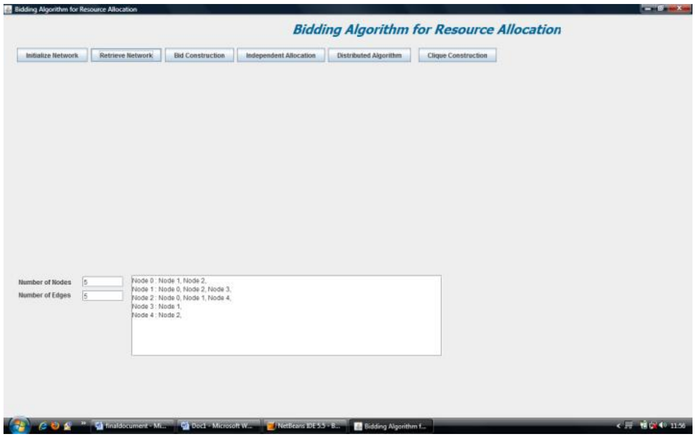


**Fig3.**:Implementation: Screenshot to Retrieve Network.

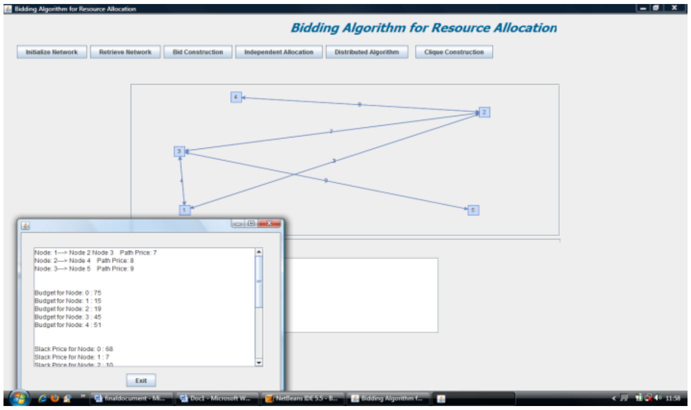


**Fig4:**:Implementation: Screenshot for Bid Construction

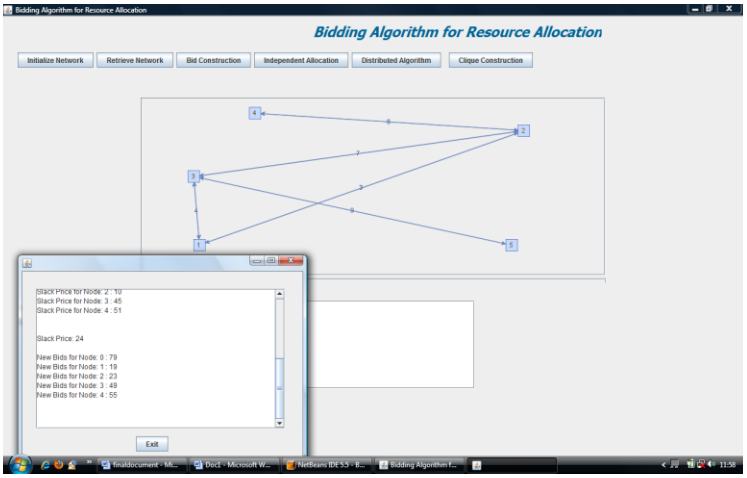


**Fig5:**:Implementation: Screenshot for Bid Construction

 

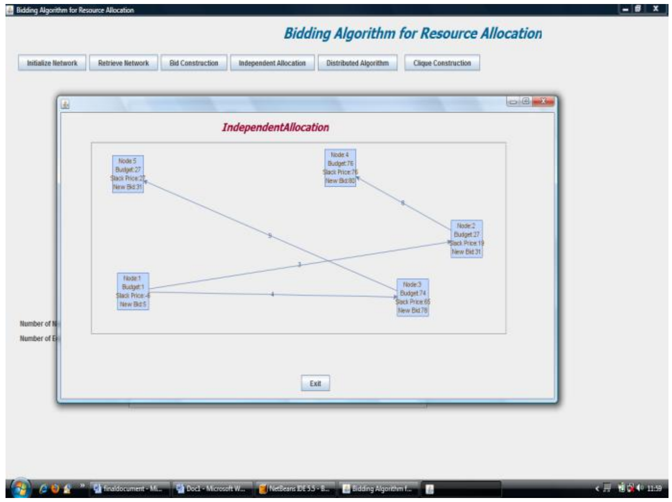


**Fig6**:Implementation: Screenshot for Independent distribution

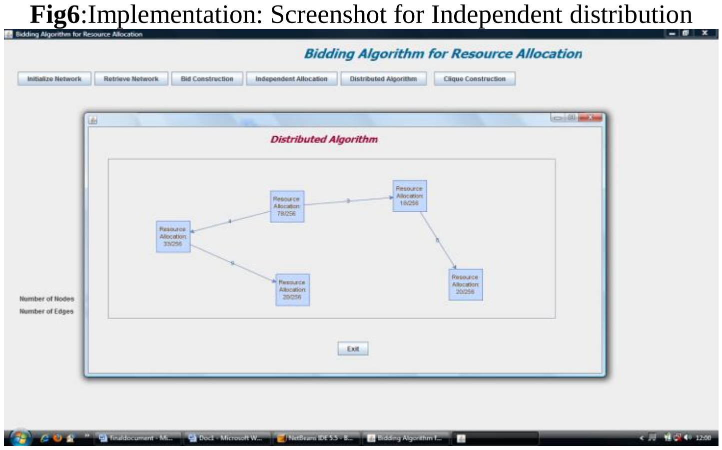


**Fig7:**:Implementation: Screenshot for Distributed algorithm

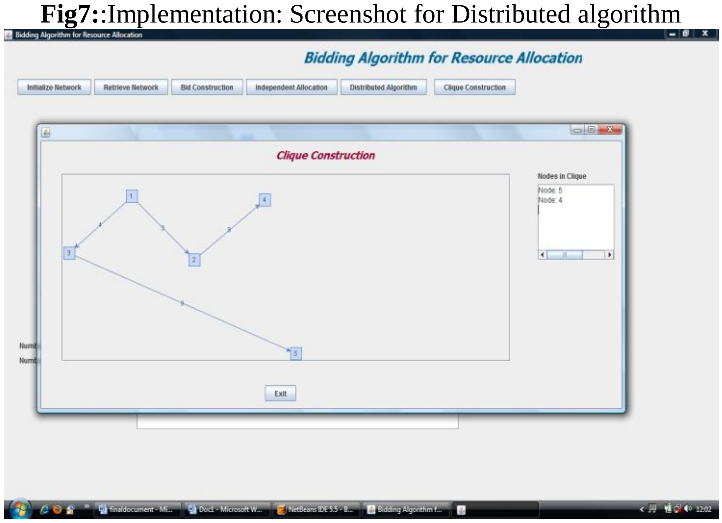


**Fig8:**Implementation: Screenshot for Clique Construction

## VI.CONCLUSION

In this paper we then propose a distributed distribution algorithm that bids for sources depending on their shadow prices, and the efficiency efficiency of the flows. Simulations show a very good performance of the distributed distribution algorithm, comparable to an optimal global distribution, and with a much lower overhead. Furthermore, in hotspot scenarios, price-constructed routing shows its benefits as compared to hop-constructed routing. Since synchronous distribution might be hard to implement in an ad hoc setting, we then present an asynchronous version of the algorithm and show that its performance is not affected by this change.

## VII.FUTURE ENHANCEMENTS

As a future work, we aim to study convergence conditions and properties of ad-hoc and theoretically prove that it converges toward the optimum. Current work includes the implementation of needed additions and modifications throughout the protocol stack of an ad hoc network, to test it using detailed packet-level simulations. We aim to study and compare the packet-level overheads introduced by our distribution algorithm. Complementary simulation studies are needed for testing the resilience of the algorithm to loss of control packets, yielding guidelines on how we can better trade-off signaling overhead against control accuracy.

Wireless networks face a paradigm shift. They intend to complement the Internet with its different services and applications, with much less available sources. Thus, we argue that without a quantitative measure for the importance of the flows, the network cannot provide source assurance and distribution flexibility at overloads. Under these conditions, combining efficiency functions with a lightweight distributed implementation could provide a very strong argument to get rid of the old performance metrics and optimize the QoS as perceived by the user.

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