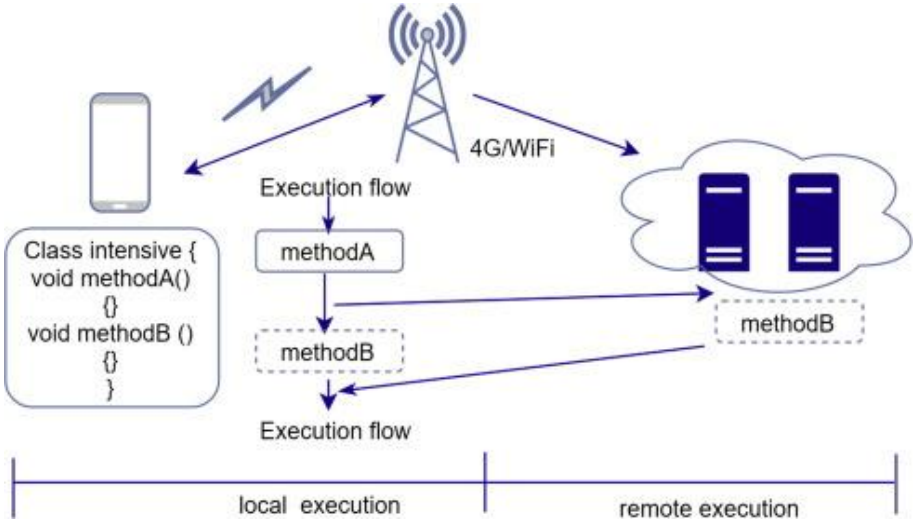
Stochastic Analysis of Delayed Mobile Offloading in Heterogeneous Networks

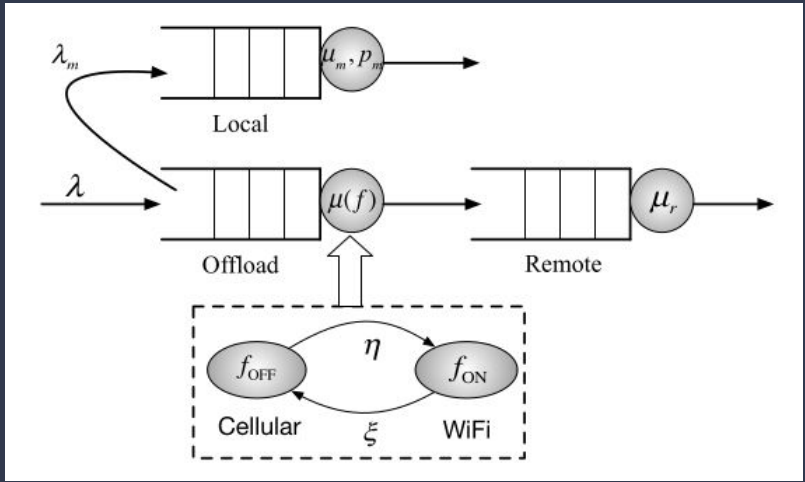
Simone Preite
Informatica Magistrale 2019/2020
Progetto di Simulazione di Sistemi

APPLICAZIONI REALI

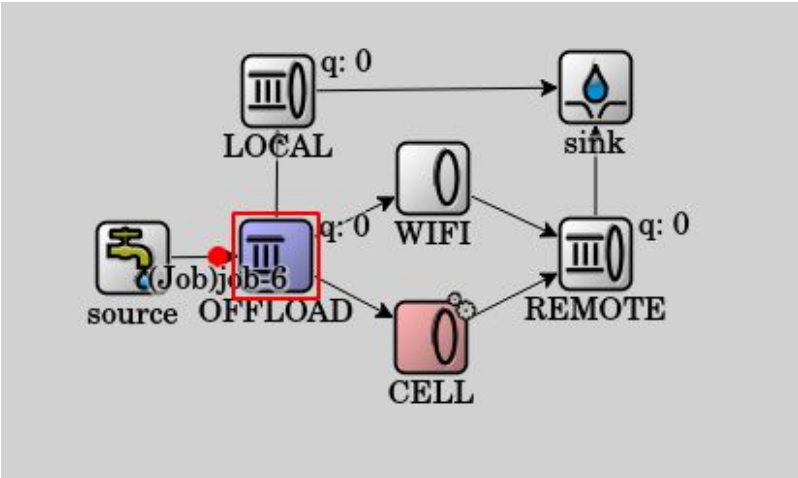
Un sistema simile a quello modellato per la simulazione può avere applicazioni all'interno della telefonia mobile.



MODELLO



Modello presentato nel paper



Modello costruito per la simulazione in OMNeT++

PARAMETRI

[General]

network = WifiCelNetPassiveQueue

*.source.interArrivalTime = exponential(120s)

*.source.packetDimension = exponential(double(10.0))

*.WIFI.serviceTime = exponential(40s)

*.CELL.serviceTime = exponential(400s)

*.OFFLOAD.switchToWi = exponential(1524s)

*.OFFLOAD.switchToCel = exponential(3120s)

*.REMOTE.serviceTime = exponential(1s)

*.LOCAL.serviceTime = exponential(5s)

*.sink.transiente = false

Elenco dei parametri riguardanti la parte generale del sistema, sono elencati i paratremi delle distrubuzioni utlizzate per inizializzare il sistema

SEED e DEADLINE

seed-set = ${seed = 7, 25, 65, 17, 5, 42, 100, 3, 6, 89, 22, 12, 10, 9, 8, 4, 2, 1, 21, 23, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52,53,54,55,56,57,58, 59,60,61,62,63, 64,65,66,67,68,69,70,71,72,73, 74,75,76,77,78,79,80, 81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99}

*.OFFLOAD.deadline = exponential(${ deadline = 900, 1200, 1500, 1980, 2400, 2700, 3000, 3300, 3600, 3900, 4200, 4500, 4800, 5100, 5400, 5700, 6000, 7500, 9000, 10500, 12000}s)

Le simulazioni sono avvenute per 100 valori diversi di seed e 21 valori di deadline.

TRANSIENTE

[Config Transiente]

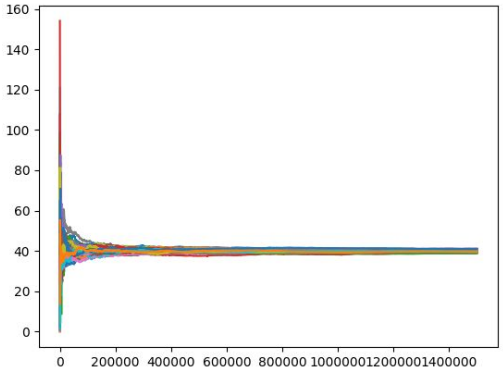
*.sink.transiente = true

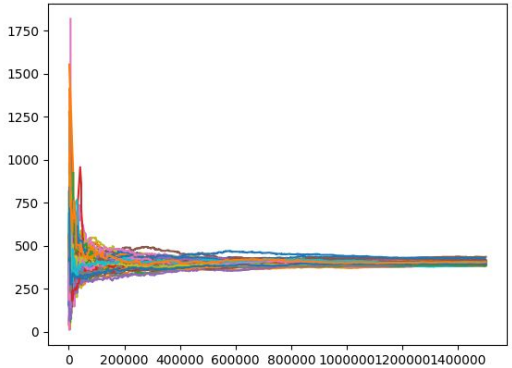
result-dir = results/Transiente/omnet

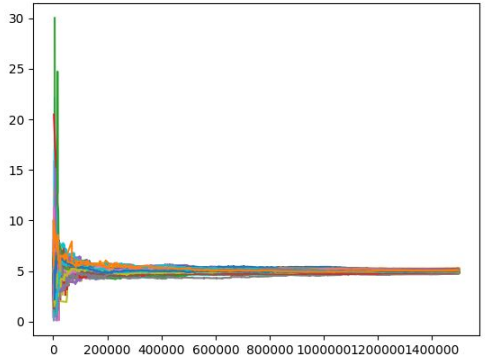
sim-time-limit = 1500000s

Per misurare il transiente si è impostato un limite temporale sufficiente al sistema per stabilizzarsi.

I service time rispettivamente di WIFI, CELL, LOCAL







SIMULATIONS

[Config Simulations]

**.numJobs = 10000

warmup-period = 500000s

result-dir = results/Simulations/omnet

[Config Simulations300]

result-dir = results/Simulations300/omnet

**.numJobs = 10000

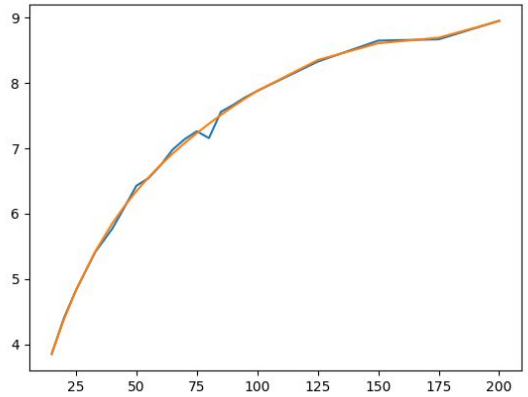
warmup-period = 500000s

*.LOCAL.serviceTime = exponential(300s)

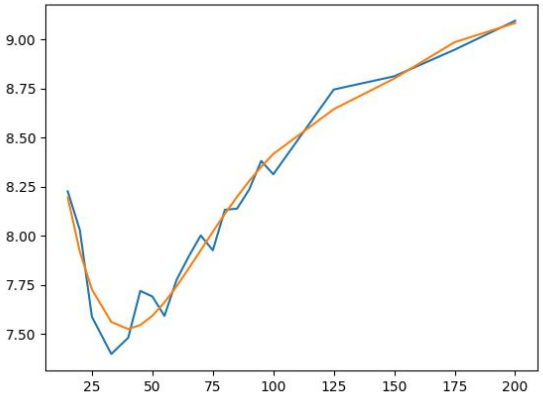
Queste due configurazioni del sistema differiscono solo per il fatto che la coda LOCAL ha un service time di 300 unità di tempo, è servito a confrontare i risultati tra il paper ed il modello in OMNeT++.

MEAN RESPONSE TIME

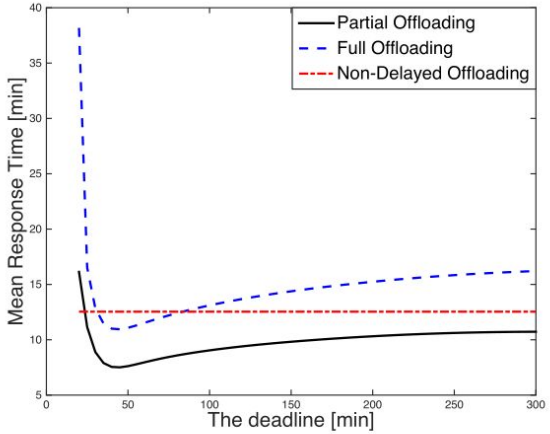
Simulations



Simulations300



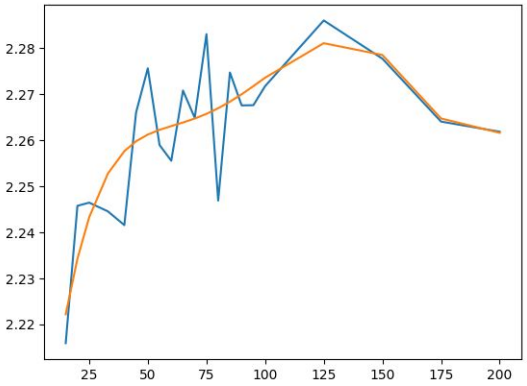
Paper



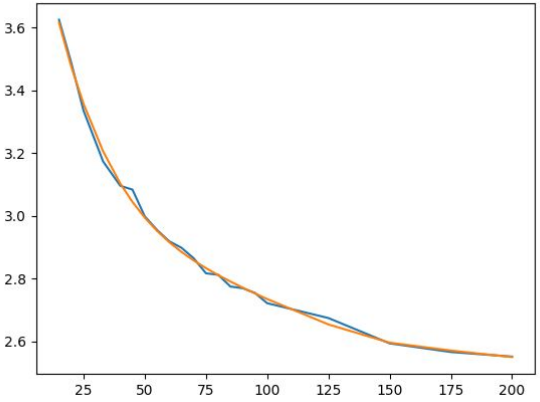
(a) Mean Response Time

MEAN ENERGY CONSUMPTION

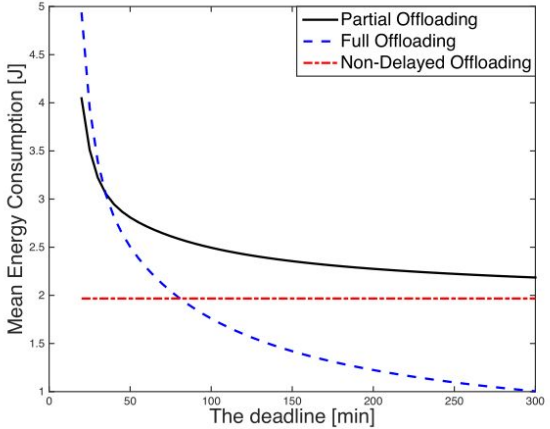
Simulations



Simulations300



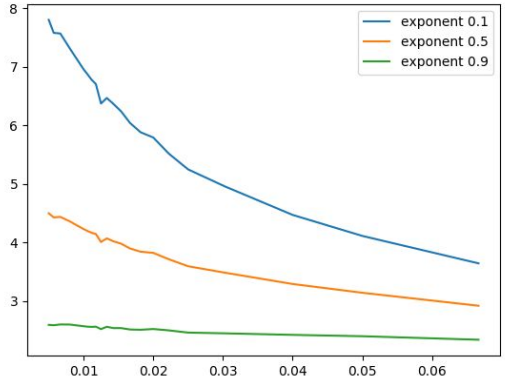
Paper



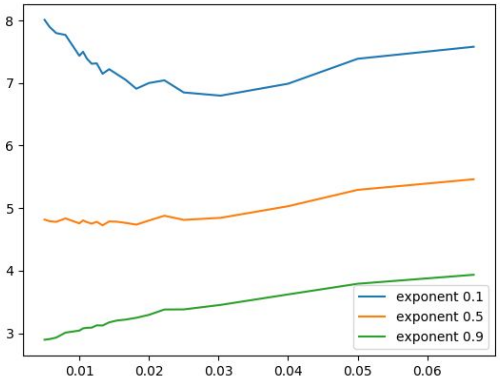
(b) Mean Energy Consumption

ERWP

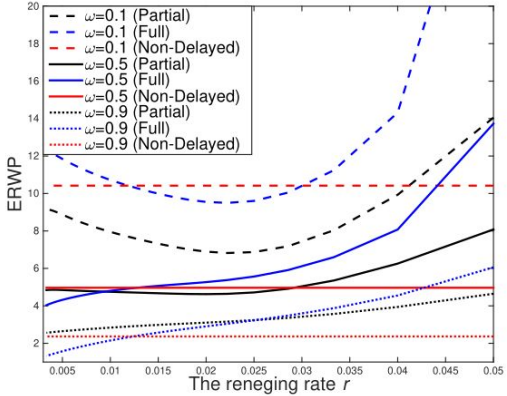
Simulations



Simulations300



Paper



INTERVALLI DI CONFIDENZA

deadline	reneging rate	batch	obs	ERWP	mean	variance	minVal	maxVal	included
15,00	0.067	5	10	22.632	22.456	0.084	22.180	22.732	OK
20,00	0.050	5	10	24.344	24.502	0.105	24.193	24.811	OK
25,00	0.040	5	10	25.504	25.586	0.341	25.029	26.143	OK
33,00	0.030	5	10	26.995	26.943	0.159	26.563	27.323	OK
40,00	0.025	5	10	27.844	27.990	0.151	27.619	28.361	OK
45,00	0.022	5	10	28.772	28.700	0.129	28.357	29.043	OK
50,00	0.020	5	10	29.609	29.542	0.053	29.323	29.762	OK
55,00	0.018	5	10	29.764	29.777	0.570	29.057	30.497	OK
60,00	0.017	5	10	30.191	30.182	0.346	29.621	30.743	OK
65,00	0.015	5	10	30.827	30.407	0.309	29.876	30.937	OK
70,00	0.014	5	10	31.129	31.270	0.717	30.462	32.077	OK
75,00	0.013	5	10	31.519	31.591	0.142	31.232	31.950	OK
80,00	0.013	5	10	31.047	30.995	0.294	30.478	31.512	OK
85,00	0.012	5	10	32.106	31.930	0.180	31.525	32.335	OK
90,00	0.011	5	10	32.274	32.586	0.803	31.731	33.440	OK
95,00	0.011	5	10	32.505	32.462	0.383	31.872	33.052	OK
100,00	0.010	5	10	32.744	32.931	0.958	31.998	33.864	OK
125,00	0.008	5	10	33.772	33.666	0.146	33.302	34.030	OK
150,00	0.007	5	10	34.349	34.345	1.711	33.098	35.592	OK
175,00	0.006	5	10	34.283	34.051	0.630	33.294	34.808	OK
200,00	0.005	5	10	34.826	34.959	0.908	34.051	35.867	OK

RIFERIMENTI

1. (PDF) Stochastic Analysis of Delayed Mobile Offloading in Heterogeneous Networks
2. OMNeT++ Discrete Event Simulator
3. Welcome to Python.org
4. WifiCelNetPassiveQueue

GRAZIE PER L’ATTENZIONE