



Institute for the Wireless Internet of Things at Northeastern University

Reproducibility Tutorial: Colosseum Batch Experiments

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at Northeastern University

Batch Mode

- Radio applications and scenarios are controlled automatically by Colosseum
- Containers need to be preconfigured to use the Radio API which will allow Colosseum to control the radio applications
- Containers **do not** have access to the teams' network storage folders
- Containers **are not** accessible by SSH (except for the nodes with node_type set to "bot")
- Batch jobs are inserted in a queue and run when resources are available

Batch Mode

Set-up through configurations files:

- Batch configuration file:
 - Tells Colosseum how to run the experiment
 - Must be saved to the network storage on the File Proxy at [`/share/nas/teamname/batch/`](/share/nas/teamname/batch/)
- Modem configuration file(s):
 - Passes any additional parameters to the container
 - Parameters need to be handled by user code
 - Must be saved to the network storage on the File Proxy at [`/share/nas/teamname/config/`](/share/nas/teamname/config/)

Batch Configuration File

- Name of batch experiment
- Duration of batch experiment
- RF Scenario to run
- Traffic scenario to run
- Mapping of SRNs to nodes in the scenarios

```
1  {
2    "BatchName": "My Test Batch",
3    "Duration": 300,
4    "RFScenario": 6742,
5    "TrafficScenario": 1,
6    "NodeData": [
7      {
8        "RFNode_ID"      : 1,
9        "ImageName"      : "modem-image-v1",
10       "ModemConfig"     : "modem_config_file_1",
11       "isGateway"       : true,
12       "TrafficNode_ID"  : 1,
13       "node_type"       : "competitor"
14     },
15     {
16       "RFNode_ID"      : 2,
17       "ImageName"      : "modem-image-v1",
18       "ModemConfig"     : "modem_config_file_2",
19       "isGateway"       : false,
20       "TrafficNode_ID"  : 2,
21       "node_type"       : "competitor"
22     }
23   ]
24 }
```

Batch Configuration File, cont'd

Mapping of SRNs to nodes in the scenarios:

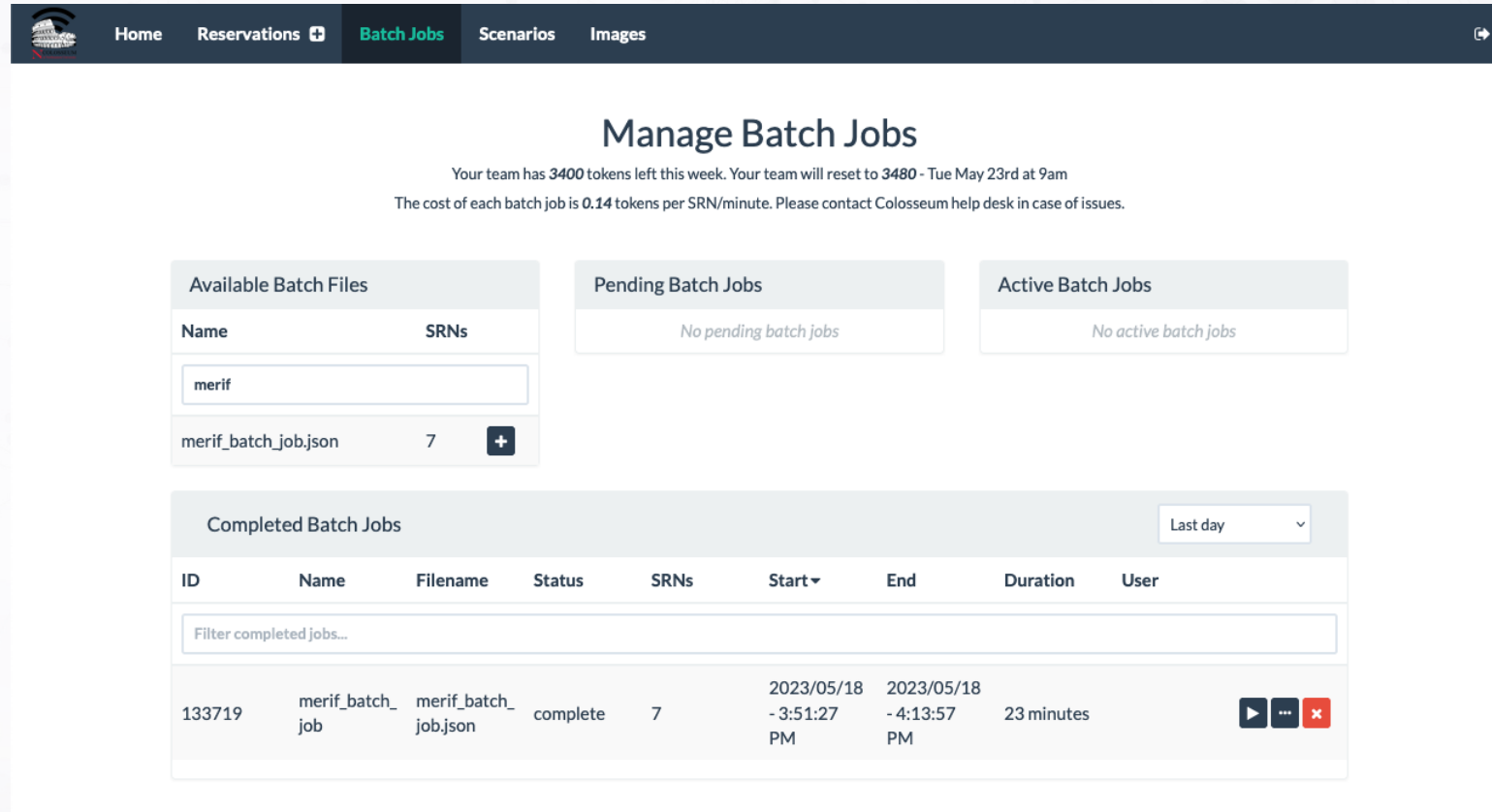
- **RFNode_ID**: Node in the RF scenario the SRN should be mapped to
- **ImageName**: Container image to load on the SRN
- **ModemConfig**: The location of the modem config file to load

```
1  {
2    "BatchName": "My Test Batch",
3    "Duration": 300,
4    "RFScenario": 6742,
5    "TrafficScenario": 1,
6    "NodeData": [
7      {
8        "RFNode_ID"      : 1,
9        "ImageName"      : "modem-image-v1",
10       "ModemConfig"     : "modem_config_file_1",
11       "isGateway"       : true,
12       "TrafficNode_ID"  : 1,
13       "node_type"       : "competitor"
14     },
15     {
16       "RFNode_ID"      : 2,
17       "ImageName"      : "modem-image-v1",
18       "ModemConfig"     : "modem_config_file_2",
19       "isGateway"       : false,
20       "TrafficNode_ID"  : 2,
21       "node_type"       : "competitor"
22     }
23   ]
24 }
```

Three red arrows originate from the text on the left and point to specific fields in the JSON configuration. The first arrow points from 'RFNode_ID' to the value 1 in the first node object. The second arrow points from 'ImageName' to the value 'modem-image-v1' in the first node object. The third arrow points from 'ModemConfig' to the value 'modem_config_file_1' in the first node object.

Example of Batch Experiment

- Cellular network w/ 1 BS and 6 UEs
- iPerf3 used to exchange traffic
- (Some) figures automatically generated after the experiment



The screenshot shows the 'Manage Batch Jobs' interface of the Colosseum system. The top navigation bar includes 'Home', 'Reservations', 'Batch Jobs' (highlighted), 'Scenarios', and 'Images'. Below the navigation bar, a message states: 'Your team has 3400 tokens left this week. Your team will reset to 3480 - Tue May 23rd at 9am. The cost of each batch job is 0.14 tokens per SRN/minute. Please contact Colosseum help desk in case of issues.'

The interface is divided into three main sections:

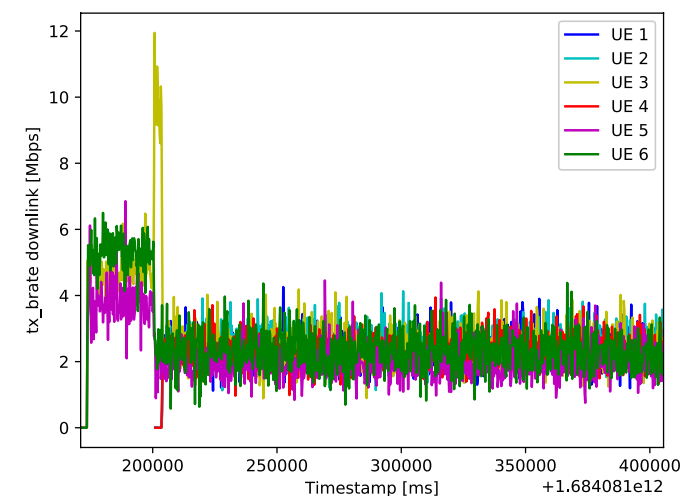
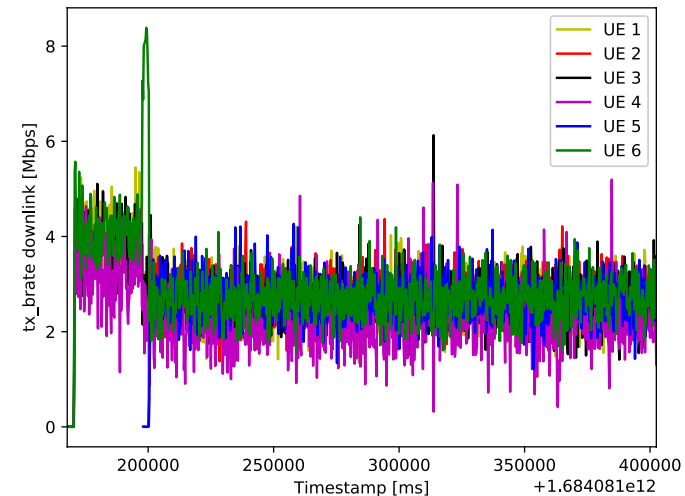
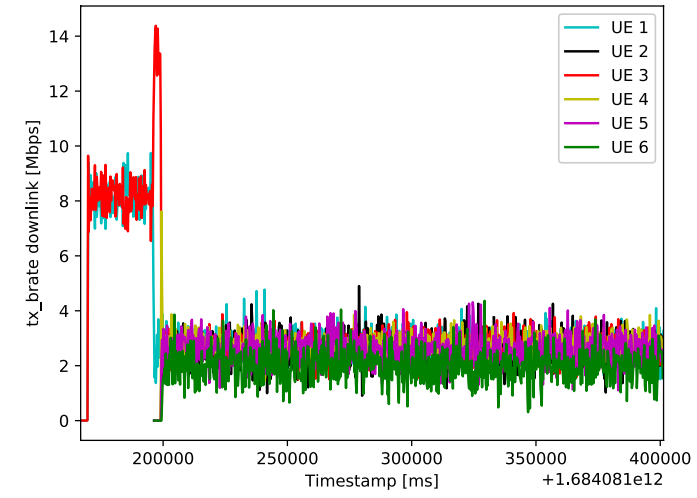
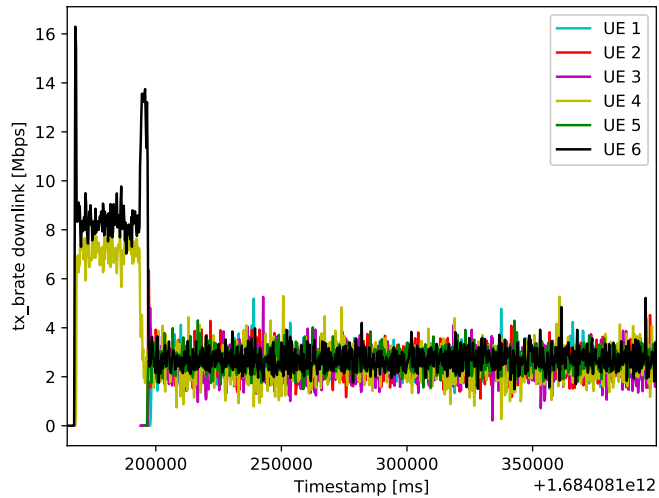
- Available Batch Files:** A table with columns 'Name' and 'SRNs'. It shows a file named 'merif' with 7 SRNs. Below the table is a search bar containing 'merif' and a '+ merif_batch_job.json 7' entry with a plus icon.
- Pending Batch Jobs:** A box indicating 'No pending batch jobs'.
- Active Batch Jobs:** A box indicating 'No active batch jobs'.

Below these sections is a 'Completed Batch Jobs' table with a 'Last day' dropdown menu. The table has columns: ID, Name, Filename, Status, SRNs, Start, End, Duration, and User. A search bar 'Filter completed jobs...' is located above the table. The table contains one entry:

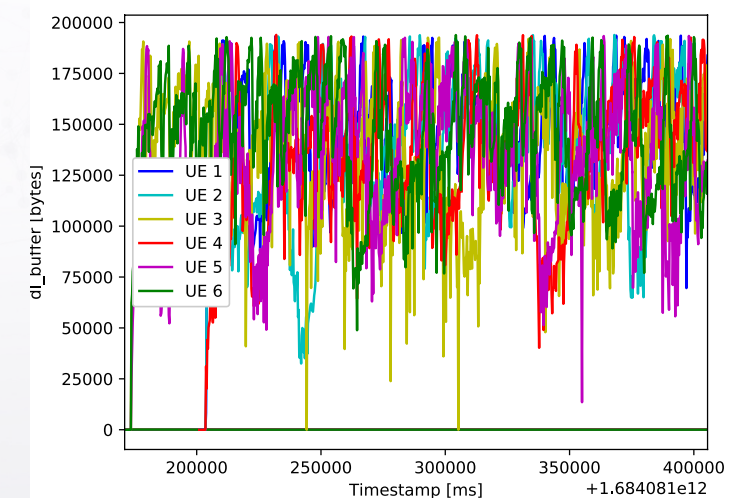
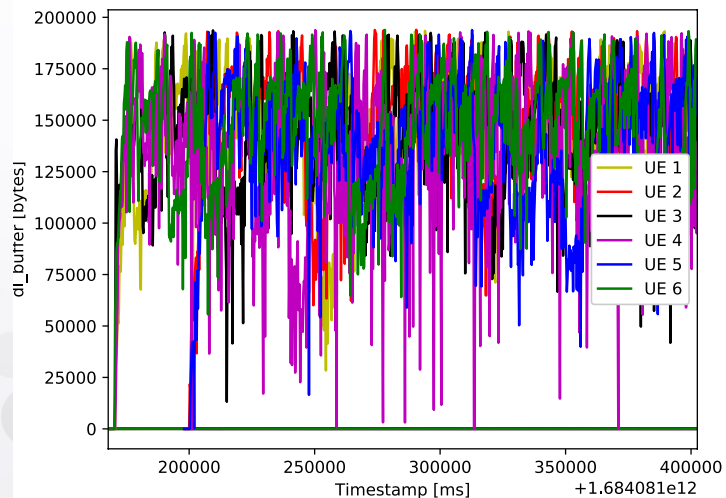
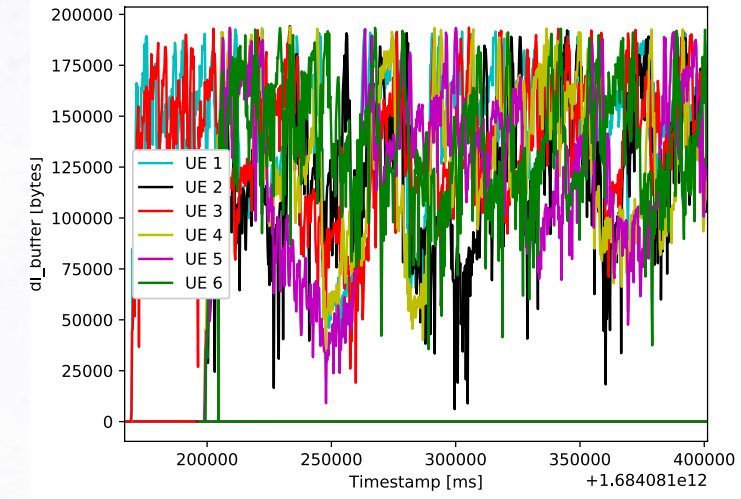
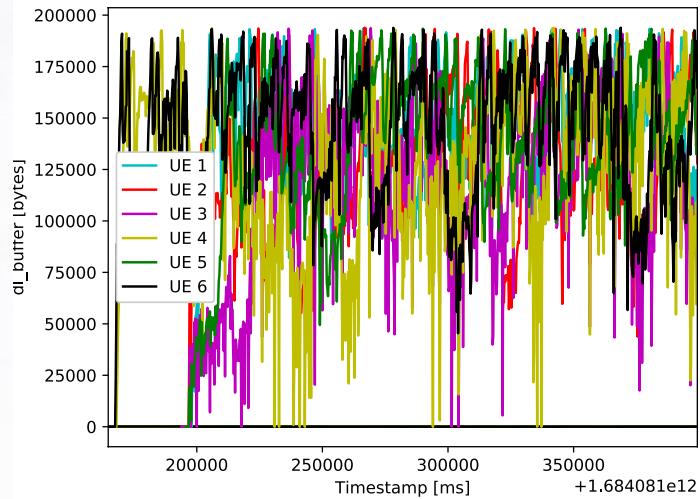
ID	Name	Filename	Status	SRNs	Start	End	Duration	User
133719	merif_batch_job	merif_batch_job.json	complete	7	2023/05/18 - 3:51:27 PM	2023/05/18 - 4:13:57 PM	23 minutes	

demo

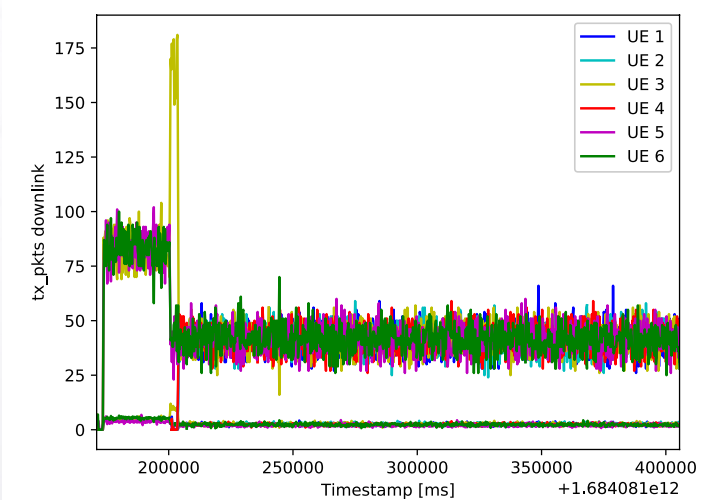
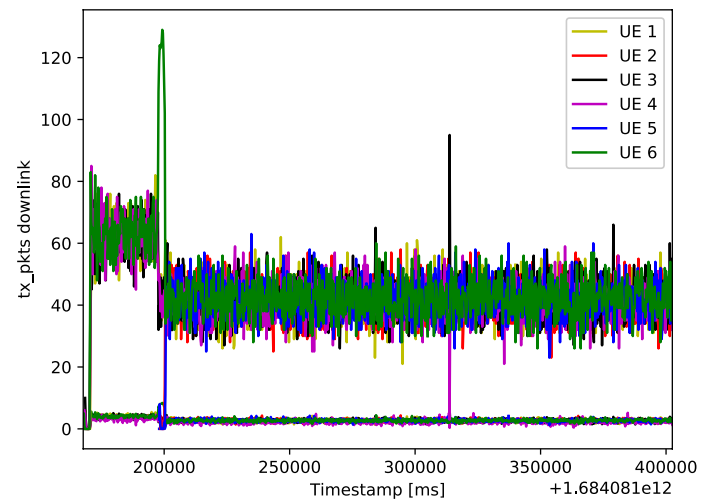
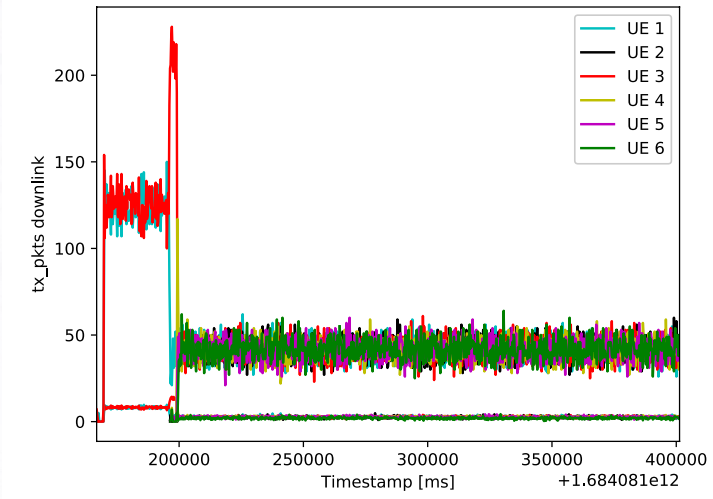
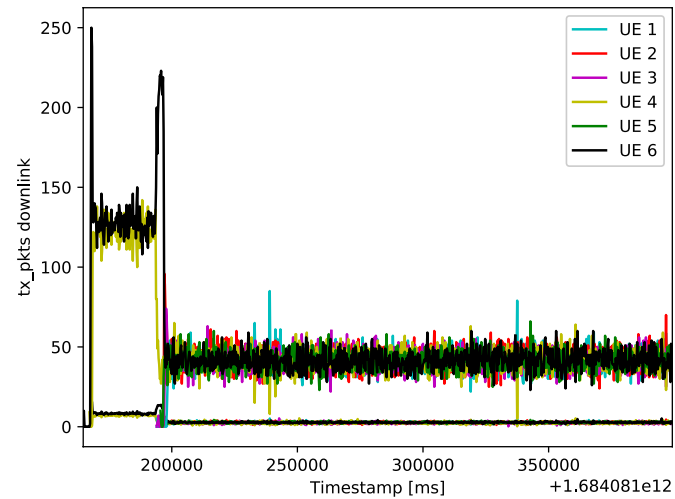
(Some) Independent Realizations: Throughput



(Some) Independent Realizations: Buffer Occupancy



(Some) Independent Realizations: Transmitted Packets





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Thank You! (Questions?)



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