

# Implementasi Topology Jaringan Inherent pada NDN di NDNSSim



**Syaiful Ahdan, Andre Febrian, Ardi Syawaldipa**

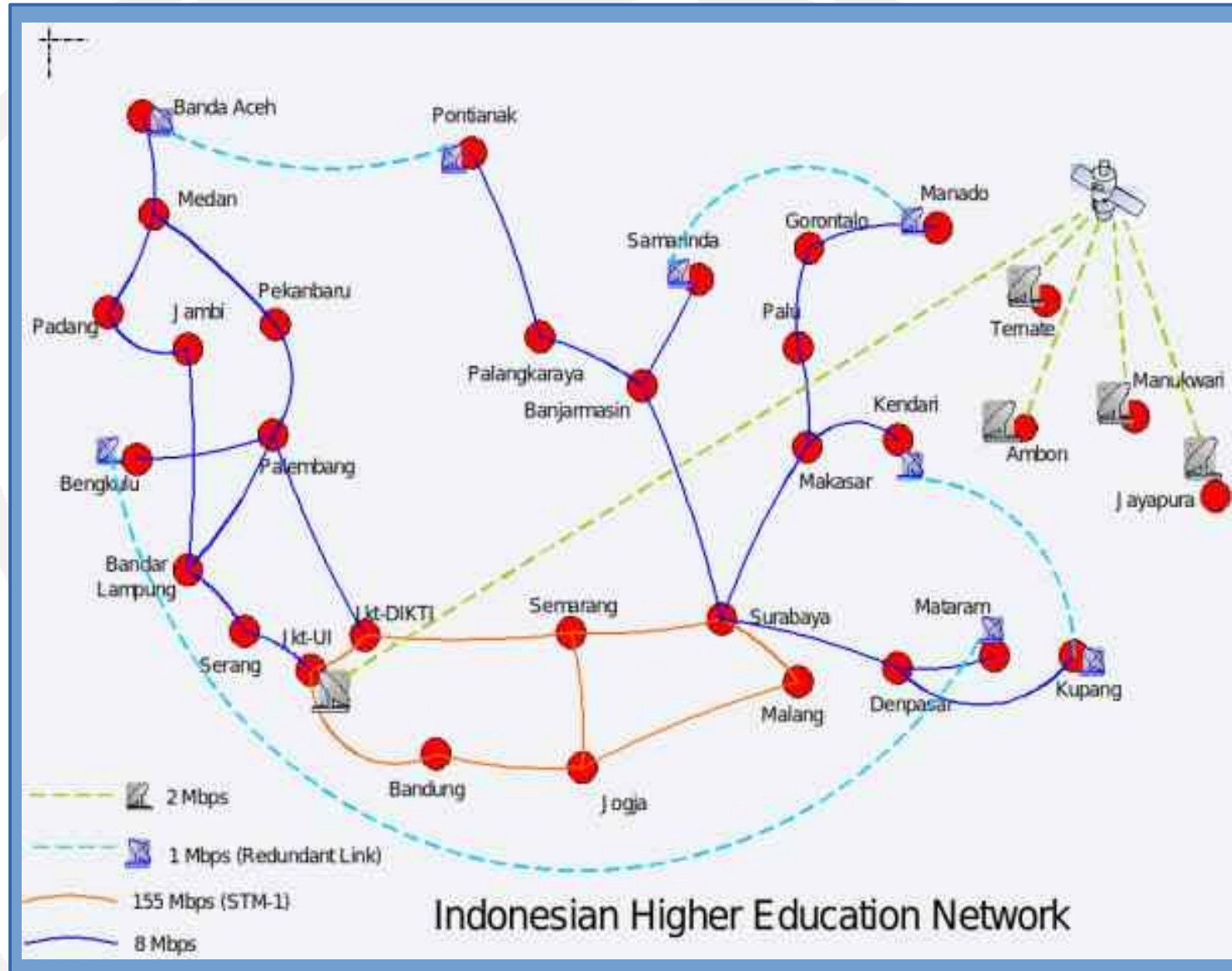
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## 2. Membuat Topology ( 5 Node )



# 3. Topology 5 nodes

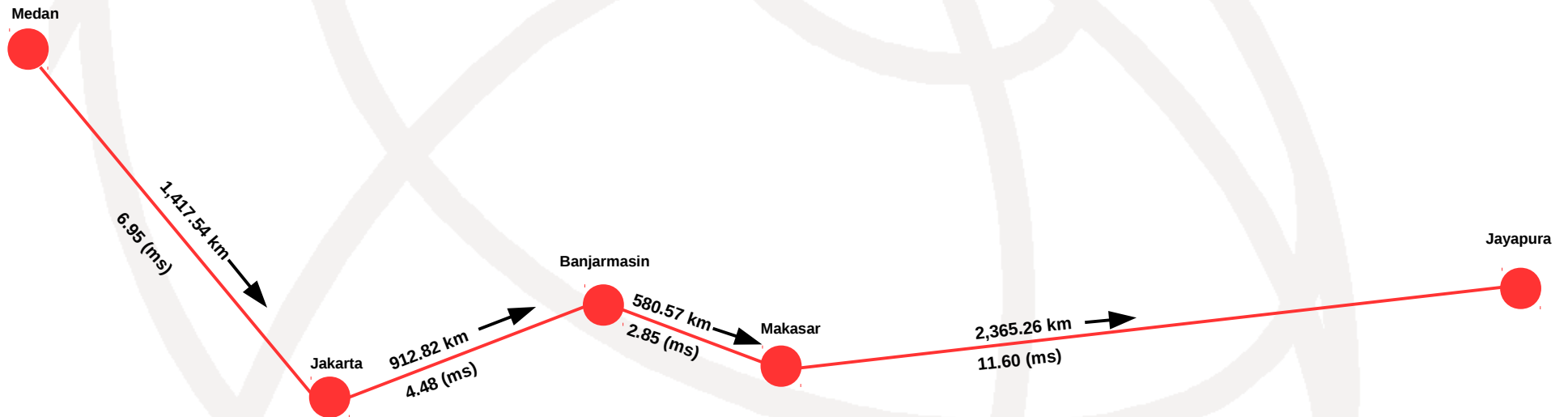
## Hyperbolic vs. Link-State Routing in NDN

*Vince Lehman, Ashlesh Gawande, Lan Wang, University of Memphis ,  
Rodrigo Aldecoa, Dmitri Krioukov, Northeastern University,  
Beichuan Zhang, University of Arizona,  
Lixia Zhang, UCLA*

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## 2. Membuat Topology ( 5 Node )



- Using 62.5 $\mu$ m Core Size Fiber Optic Multi-mode 1310 Wavelength
- Get X Y Coordinates : <http://beta.ngs.noaa.gov/gtkweb/>
- Get Delay : <http://www.timbercon.com/time-delay-of-light-in-fiber-calculator/>

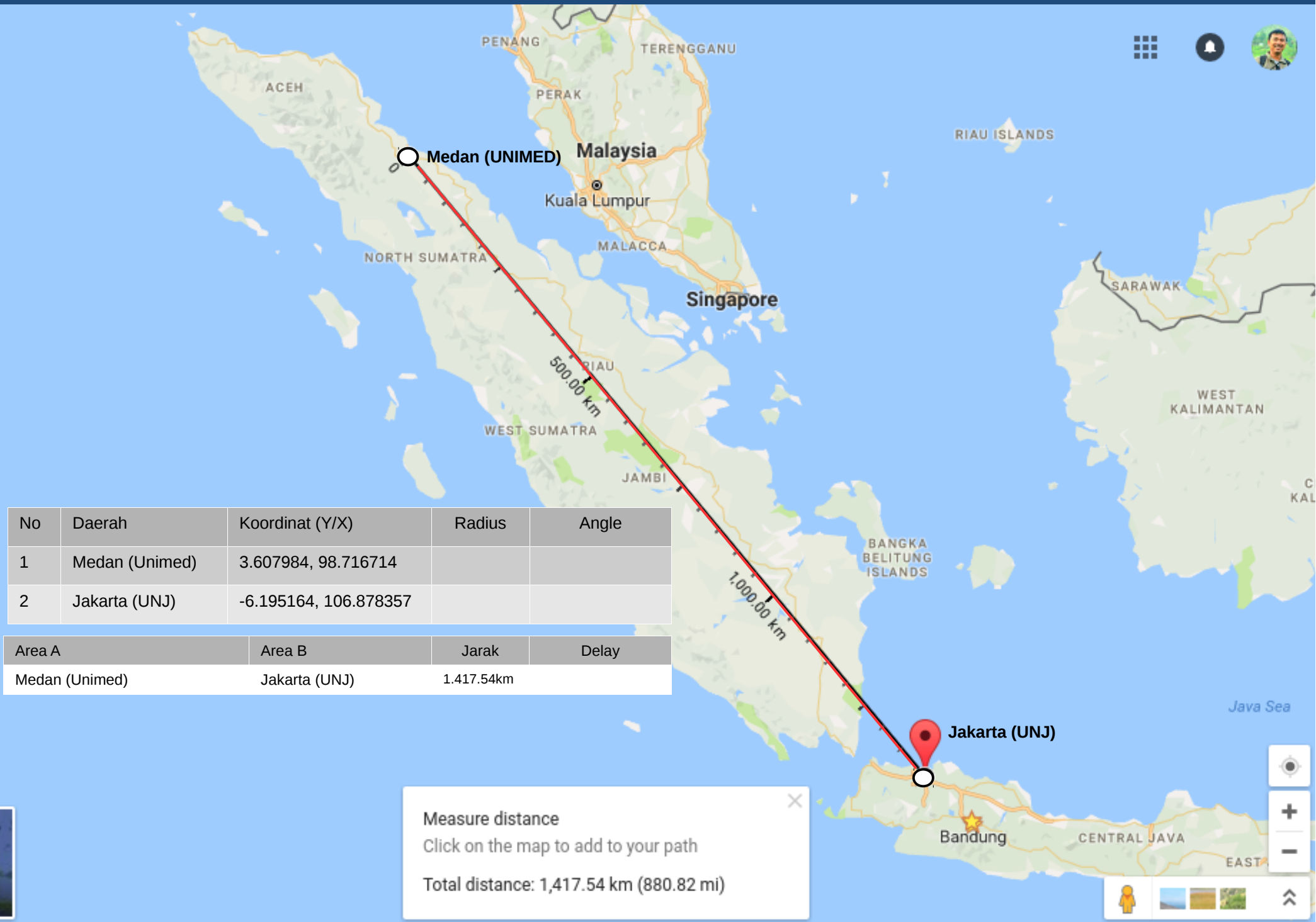
# 1. Menentukan Koordinat

No	Area	Koordinat (Y/X)	X (m)	X (m)	Radius	Angle	Keterangan
1	Medan (A)	3.607984, 98.716714	-964689.992	6292056.066	6217663.77	98.716639	UNIMED
2	Jakarta (B)	-6.195164, 106.878357	-1841111.078	6068049.938	5782001.388	106.878357	UNJ
3	Banjarmasin (C)	-3.297520, 114.586435	-2649387.602	5790385.965	5148719.74	114.586435	UNLAM
4	Makasar (D)	-5.132406, 119.488011	-3127114.38	5529855.227	4560751.787	119.4880131	UNHAS
5	Jayapura (E)	-2.609538, 140.659686	-4927788.88	4039141.208	2822841.430	140.6596905	UNCEN

No	Area		Jarak	Delay
1	Medan	Jakarta	1,417.54 km	6.9509614437
2	Jakarta	Banjarmasin	912.82 km	4.4760476777
3	Banjarmasin	Makasar	580.57 km	2. 8468471333
4	Makasar	Jayapura	2,365.26 km	11.5981426023

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- See : <http://www.thefoa.org/tech/ref/basic/fiber.html>

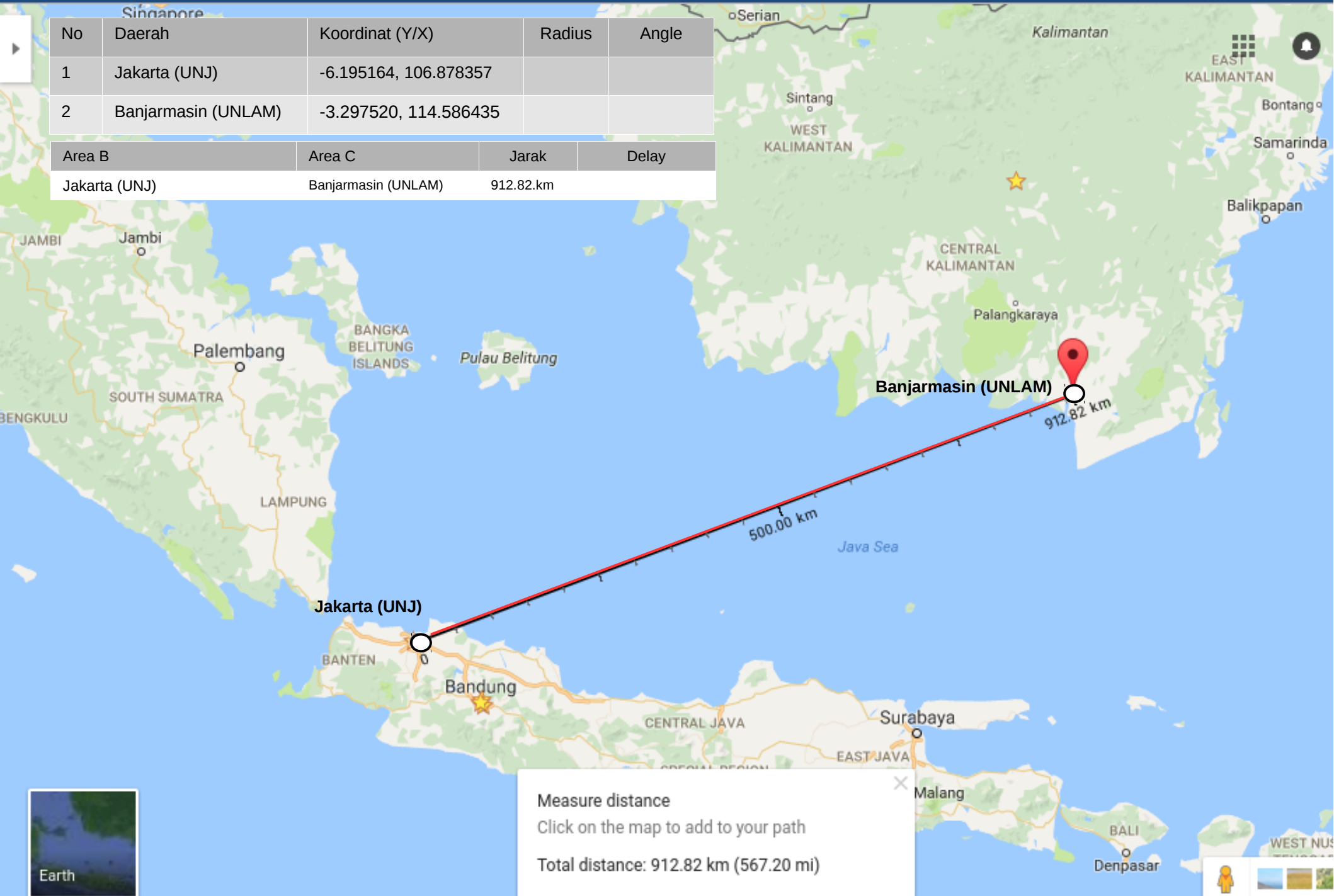
## 2. Penentuan Jarak (Medan - Jakarta)



## 2. Penentuan Jarak (Jakarta - Banjarmasin)

No	Daerah	Koordinat (Y/X)	Radius	Angle
1	Jakarta (UNJ)	-6.195164, 106.878357		
2	Banjarmasin (UNLAM)	-3.297520, 114.586435		

Area B	Area C	Jarak	Delay
Jakarta (UNJ)	Banjarmasin (UNLAM)	912.82.km	

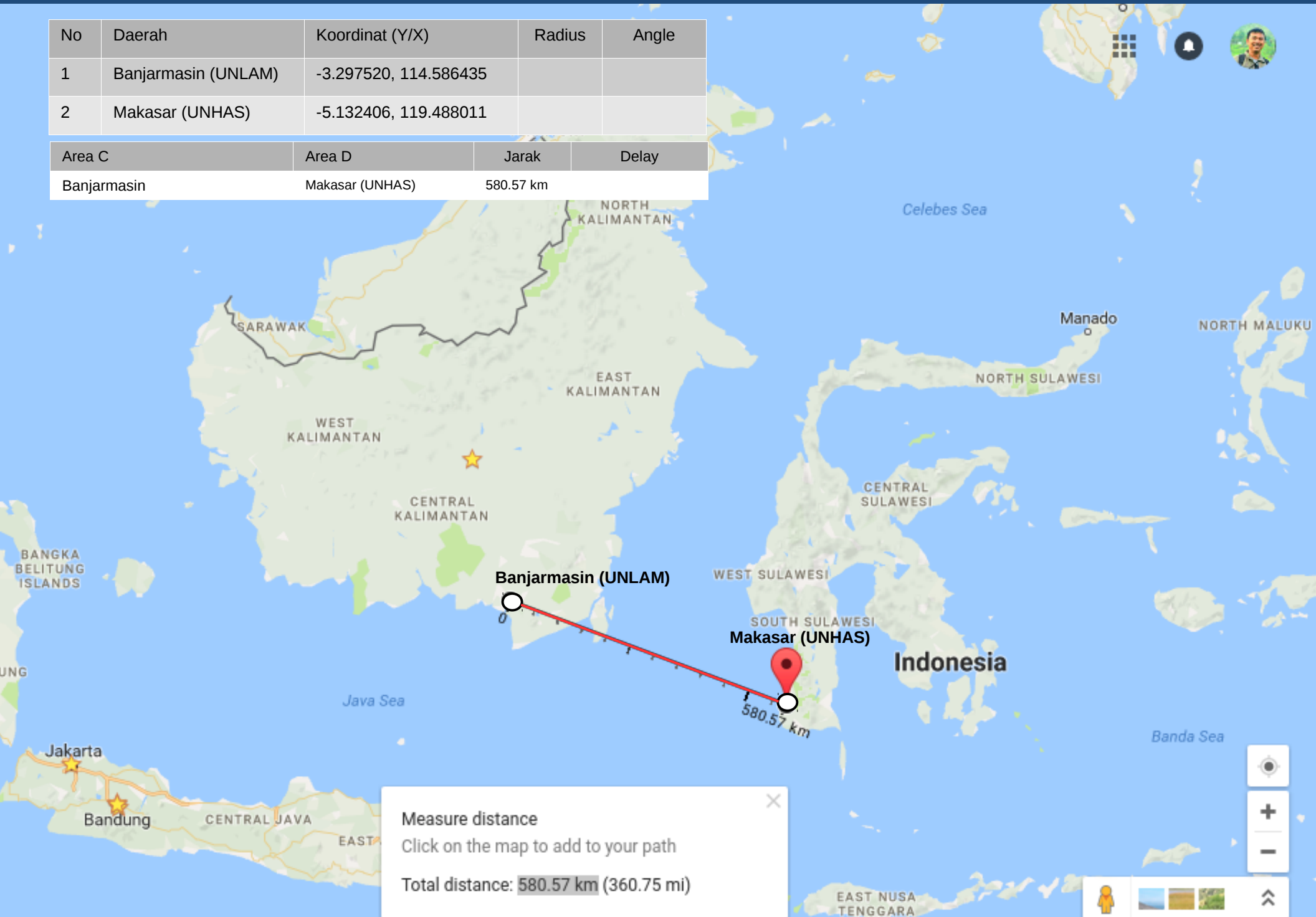




## 2. Penentuan Jarak (Banjarmasin- Makasar)

No	Daerah	Koordinat (Y/X)	Radius	Angle
1	Banjarmasin (UNLAM)	-3.297520, 114.586435		
2	Makasar (UNHAS)	-5.132406, 119.488011		

Area C	Area D	Jarak	Delay
Banjarmasin	Makasar (UNHAS)	580.57 km	

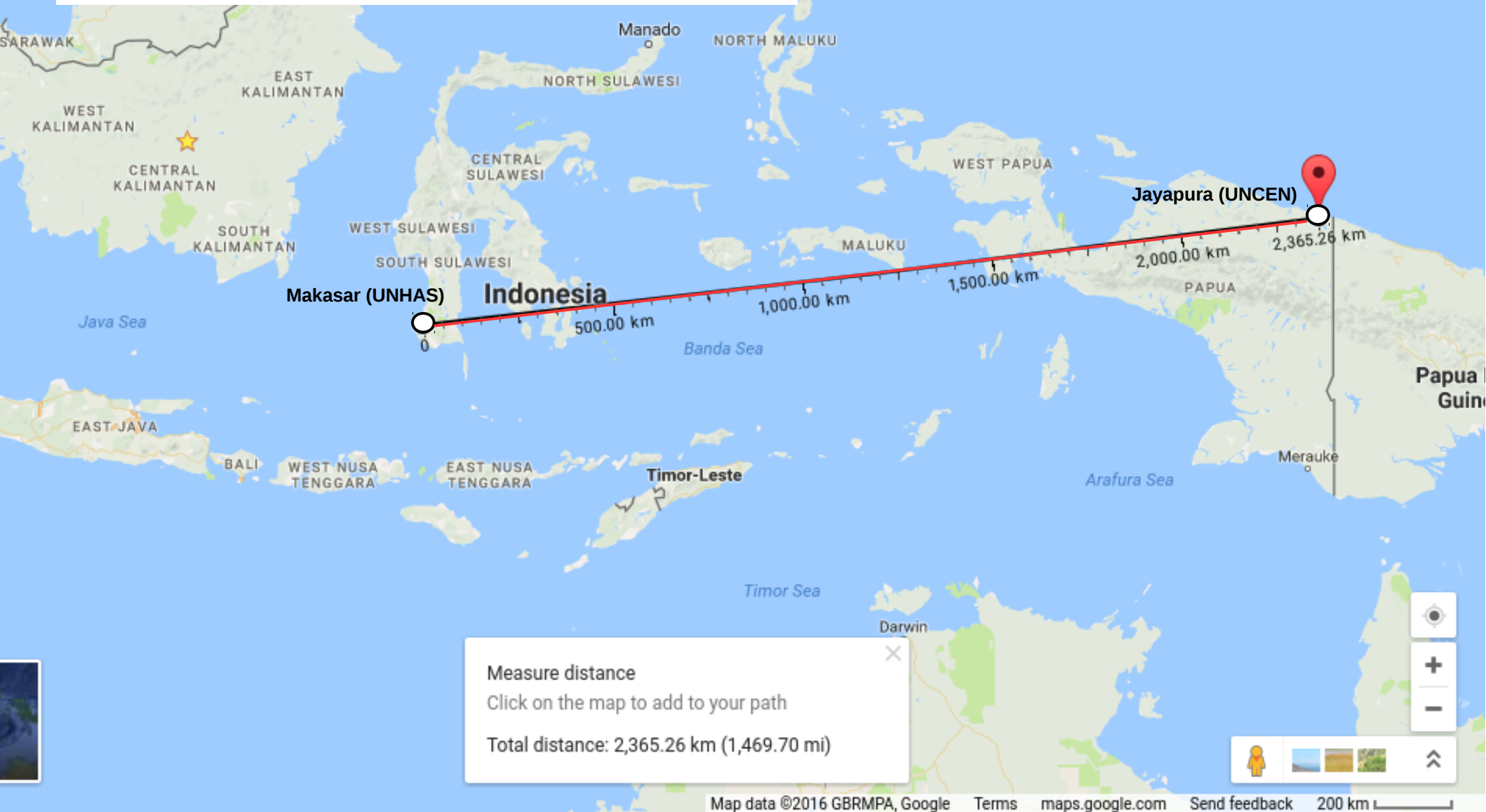




## 2. Penentuan Jarak (Makasar - Jayapura)

No	Daerah	Koordinat (Y/X)	Radius	Angle
1	Makasar (UNHAS)	-5.132406, 119.488011		
2	Jayapura (UNCEN)	-2.609538, 140.659686		

Area D	Area E	Jarak	Delay
Makasar (UNHAS)	Jayapura (UNCEN)	2.365.26 km	





# Topology Inherent

## Hyperbolic vs. Link-State Routing in NDN

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# 1. Node Koordinat

## Hyperbolic vs. Link-State Routing in NDN

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# 1. Menentukan Koordinat

## Area 1 ( Sumatera)

No	Area	id	Koordinat (Y/X)	Y	X	Radius	Angle
1	Banda-aceh	0	5.547771,95.318056	6321204.306	-588409.639	6348531.309	95.3180
2	medan	1	3.593621,98.683212	6292786.481	-961044.732	6218966.849	98.6832
3	padang	2	-0.950506,100.420095	6272160.307	-1153430.874	6165191.979	100.4200
4	jambi	3	-1.487983,103.689723	6194936.131	-1508985.494	6008343.767	103.6897
5	pekanbaru	4	0.506581, 101.442546	6251191.312	-1265292.653	6121799.488	101.4425
6	bengkulu	5	-3.881536,102.311968	6217316.617	-1356954.728	6067429.421	102.3119
7	Palembang	6	-2.976217,104.786296	6158726.63	-1625629.991	5940306.46	104.7826
8	Bandar-lampung	7	-5.400549,105.267988	6125956.169	-1672193.714	5893310.374	105.2679

## Area 2 ( Jawa)

No	Area	id	Koordinat (Y/X)	(Latitude)	(Longitude)	Radius	Angle
1	serang	8	-6.110482,106.164684	6091475.373	-1765666.339	5829965.231	91.6518
2	jkt-ui	9	-6.367999,106.829741	6067608.361	-1835356.17	5783367.44	106.8297
3	jkt-dikti	10	-6.185724,106.828034	6069772.393	-1835813.376	5785492.732	106.8280
4	bandung	11	-6.917062,107.612244	6035283.231	-1915924.221	5723100.389	107.6122
5	semarang	12	-7.005007,110.431204	5932649.836	-2210011.307	5505650.198	110.4312
6	jogjakarta	13	-7.823697,110.426805	5921871.157	-2205478.327	5495855.106	110.4268
7	surabaya	14	-7.256549,112.746003	5835362.235	-2446491.819	5297747.653	112.7460
8	malang	15	-7.967759,112.627316	5830801.005	-2430390.38	5300136.127	112.6273

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# 1. Menentukan Koordinat

## Area 3 ( Kalimantan)

No	Area	id	Koordinat (Y/X)	Y (Latitude)	X (Longitude)	Radius	Angle
1	pontianak	16	-0.027155,109.336353	6018417.847	-2111907.768	5635707.494	109.3363
2	palangkaraya	17	-2.216905,113.906811	5826658.488	-2582848.336	5222915.24	113.9068
3	banjarmasin	18	-3.319651,114.600981	5789584.755	-2650798.762	5147091.297	114.6009
4	samarinda	19	-0.496316,117.144002	5675516.422	-2909810.71	4872832.074	117.1440

## Area 4 ( Sulawesi)

No	Area	id	Koordinat (Y/X)	Y (Latitude)	X (Longitude)	Radius	Angle
1	gorontalo	20	0.684602,122.388756	5385586.498	-3416314.756	4163332.249	122.3887
2	manado	21	1.475225,124.839435	5233229.124	-3642533.314	3757477.627	124.8394
3	palu	22	-0.901072,119.876700	5529859.612	-3176818.657	4526275.571	119.8767
4	makasar	23	-5.147719,119.437921	5532454.833	-3122204.091	5523638.754	119.4379
5	kendari	24	-3.999774,122.518159	5365227.018	-3420417.615	4133570.405	122.5181

## Area 5 ( Bali)

No	Area		Koordinat (Y/X)	Y (Latitude)	X (Longitude)	Radius	Angle
1	Denpasar	25	-8.670641,115.221856	5704630.763	-2687053.887	5032151.98	115.2218

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# 1. Menentukan Koordinat

## Area 6 ( Lombok)

No	Area	id	Koordinat (Y/X)	Y (Latitude)	X (Longitude)	Radius	Angle
1	mataram	26	-10.179337,123.606475	-8.577853	116.095311		

## Area 7 ( Timor)

No	Area	id	Koordinat (Y/X)	Y (Latitude)	X (Longitude)	Radius	Angle
1	Kupang	27	-10.179337,123.606475	5229081.128	-3475045.053	3907345.816	123.6064

## Area 8

No	Area	id	Koordinat (Y/X)	Y (Latitude)	X (Longitude)	Radius	Angle
1	ternate	28	0.795718,127.361632	5069047.902	-3870203.8	3273647.687	127.3616
2	ambon	29	-3.656100,128.197140	5002421.488	-3936113.227	3087269.572	128.1971
3	manokwari	30	-2.592231,140.674844	4037892.416	-4928923.673	4037893.026	140.6748
4	jayapura	31	-5.147719,140.674844	4025807.615	-4914172.15	4025088.225	140.6748
5	host	32	7.567348,134.535784	4507133.862	-4434684.789	4507134.354	134.5357

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## 2. Node Links

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## 2. Link Node

No	Area 1 (Sumatera)		Jarak	Delay		Bandwidth
1	Banda-aceh	medan	430.94 km (267.77 mi)	2.1131307226	2.1	8Mbps
2	medan	pekanbaru	461.34 km (286.66 mi)	2.2621982818	2.3	8Mbps
3	medan	padang	541.05 km (336.20 mi)	2.6530593064	2.7	8Mbps
4	Padang	jambi	363.55 km (225.90 mi)	1.7826812879	1.8	8Mbps
5	pekanbaru	palembang	536.25 km (333.21 mi)	2.6295223233	2.6	8Mbps
6	palembang	bengkulu	504.33 km (313.38 mi)	2.4730013861	2.5	8Mbps
7	pekanbaru	bandar-lampung	290.93 km (180.77 mi)	1.4265863488	1.4	8Mbps
8	jambi	bandar-lampung	463.75 km (288.16 mi)	2.2740158087	2.3	8Mbps

No	Area 2 (Jawa)		Jarak	Delay		
1	serang	bandar-lampung	127.02 km (78.93 mi)	0.6228474135	0.6	8Mbps
2	serang	jkt-ui	79.27 km (49.26 mi)	0.3887034677	0.4	8Mbps
3	jkt-ui	jkt-dikti	16.29 km (10.12 mi)	0.0798786362	0.1	155Mbps
4	jkt-ui	bandung	107.15 km (66.58 mi)	0.5254141109	0.5	155Mbps
5	bandung	jogjakarta	318.72 km (198.04 mi)	1.5628556735	1.6	155Mbps
6	jogjakarta	malang	249.62 km (155.11 mi)	1.2240211885	1.2	155Mbps
7	jogjakarta	semarang	88.46 km (54.97 mi)	0.4337669832	0.4	155Mbps
8	semarang	surabaya	256.60 km (159.44 mi)	1.2092125034	1.2	155Mbps
9	Surabaya	Malang	79.93 km (49.67 mi)	0.3919398029	0.4	155Mbps

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## 2. Link Node

No	Area 3 (Kalimantan)		Jarak	Delay		Bandwidth
1	banda-aceh	pontianak	1,676.08 km (1,041.47 mi)	8.2187221924	8.2	1Mbps
2	pontianak	palangkaraya	563.31 km (350.03 mi)	2.7622120652	2.8	8Mbps
3	palangkaraya	banjarmasin	144.22 km (89.61 mi)	0.7071882694	0.7	8Mbps
4	banjarmasin	samarinda	422.61 km (262.60 mi)	2.0722842500	2.1	8Mbps
5	banjarmasin	surabaya	483.85 km (300.65 mi)	2.3725769252	2.4	8Mbps
6	samarinda	manado	883.45 km (548.95 mi)	4.3320307628	4.3	1Mbps

No	Area 4 (Sulawesi)		Jarak	Delay		Bandwidth
1	gorontalo	manado	263.41 km (163.68 mi)	1.2916409794	1.3	8Mbps
2	gorontalo	palu	334.93 km (208.11 mi)	1.6423420266	1.6	8Mbps
3	palu	makasar	474.73 km (294.98 mi)	2.3278566574	2.3	8Mbps
4	makasar	kendari	363.46 km (225.84 mi)	1.7822399695	1.8	8Mbps
5	makasar	surabaya	775.87 km (482.10 mi)	3.8045081305	3.8	8Mbps

No	Area 5 (bali)		Jarak	Delay		Bandwidth
1	denpasar	surabaya	313.00 km (194.49 mi)	1.5348074353	1.5	8Mbps

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## 2. Link Node

No	Area 6 (lombok)		Jarak	Delay		
1	denpasar	mataram	97.78 km (60.76 mi)	0.4794679586	0.5	8Mbps
2	denpasar	kupang	934.87 km (580.90 mi)	4.5841706935	4.6	8Mbps
3	mataram	bengkulu	1,616.73 km (1,004.59 mi)	7.9276972043	7.9	1Mbps

No	Area 7		Jarak	Delay		Bandwidth
1	kupang	kendari	697.38 km (433.33 mi)	3.4196294225	3.4	1Mbps

No	Area 8		Jarak	Delay		
1	ternate	host	1,094.94 km (680.37 mi)	5.3690800423	5.4	2Mbps
2	ambon	host	1,431.99 km (889.80 mi)	7.0218175697	7.0	2Mbps
3	manokwari	host	938.68 km (583.27 mi)	4.6028531738	4.6	2Mbps
4	jayapura	host	1,318.78 km (819.45 mi)	6.4666880178	6.5	2Mbps
5	host	Jkt-ui	3,441.55 km (2,138.48 mi)	16.8757716584	16.9	2mbps

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## 2. Membuat Topology Inherent

File : topo-indonesia-inheren.txt

router

# Area 1 (Sumatera)

#	-----			
# node	comment	(y)latitude	(x)longitude	
#	-----			
banda-aceh	NA	5.547771	95.318056	
medan	NA	3.593621	98.683212	
padang	NA	-0.950506	100.420095	
jambi	NA	-1.487983	103.689723	
pekanbaru	NA	0.506581	101.442546	
bengkulu	NA	-3.881536	102.311968	
palembang	NA	-2.976217	104.786296	
bandar-lampung	NA	-5.400549	105.267988	
#	-----			

# Area 2 (Jawa)

#	-----			
# node	comment	(y)latitude	(x)longitude	
#	-----			
serang	NA	-6.110482	106.164684	
jkt-ui	NA	-6.367999	106.829741	
jkt-dikti	NA	-6.185724	106.828034	
bandung	NA	-6.917062	107.612244	
semarang	NA	-7.005007	110.431204	
jogjakarta	NA	-7.823697	110.426805	
surabaya	NA	-7.256549	112.746003	
malang	NA	-7.967759	112.627316	
#	-----			



## 2. Membuat Secenario

File : ndn-indonesia-inheren.cc

```
#include "ns3/core-module.h"
#include "ns3/network-module.h"
#include "ns3/ndnSIM-module.h"
#include "ns3/netanim-module.h"

namespace ns3 {

int
main(int argc, char* argv[])
{
    CommandLine cmd;
    cmd.Parse(argc, argv);

    AnnotatedTopologyReader topologyReader("", 25);
    topologyReader.SetFileName("src/ndnSIM/examples/topologies/topo-indonesia-inheren.txt");
    topologyReader.Read();

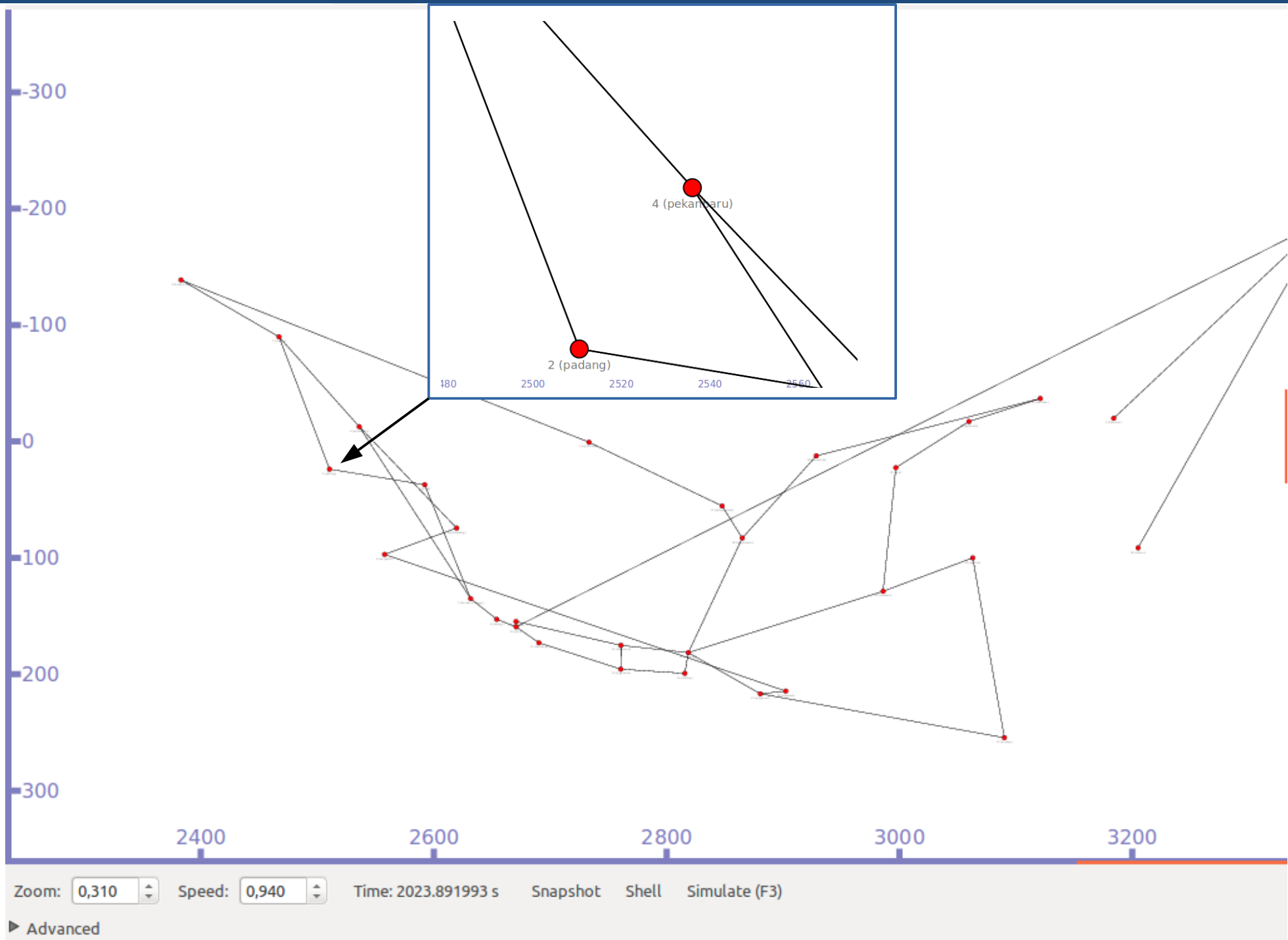
    // Install NDN stack on all nodes
    ndn::StackHelper ndnHelper;
    ndnHelper.InstallAll();

    // Set BestRoute strategy
    ndn::StrategyChoiceHelper::InstallAll("/", "/localhost/nfd/strategy/best-route");

    // Installing global routing interface on all nodes
    ndn::GlobalRoutingHelper ndnGlobalRoutingHelper;
    ndnGlobalRoutingHelper.InstallAll();

    //Getting containers for the consumer/producer
    Ptr<Node> producer = Names::Find<Node>("banda-aceh");
    NodeContainer consumerNodes;
    consumerNodes.Add(Names::Find<Node>("jayapura"));
    consumerNodes.Add(Names::Find<Node>("padang"));
```

## 2. Topology di NDNsim



## 2. Topology di NS3

