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Benefits of Shunt Capacitor Bank Distribution Network

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Abstract: This paper presents effect of shunt capacitor banks in distribution network on voltage, losses, and lines loading. This paper also presents efficient use of existing shunt capacitor banks for voltage-var control in distribution system in order to avoid installation of new shunt capacitors allowing economy of operation. In order to verify the effectiveness of 33 IEEE Bus system the procedure has been simulated to the 12.66 kV . IEEE 33 bus network has been modelled using Mi-Power power system analysis software which is developed by M/s PRDC Bangalore. Results of tests which are conducted on the model system in various possible field conditions are presented and discussed. Simulation results are presented to show the potential of application of the proposed method.

Keywords: Voltage collapse, voltage stability, shunts capacitor, line loading.

I. INTRODUCTION

The reactive power flow [3]. In the electric power systems Shunt Capacitors have several uses like they are utilized as sources of reactive power by connecting them in line-to-neutral [5].

Shunt capacitor banks are used to improve the quality of the electrical supply and the efficient operation of the power system [6]. Studies show that a flat voltage profile on the system can significantly reduce line losses. Shunt capacitor banks are relatively inexpensive and can be easily installed anywhere on the network. Shunt capacitor banks are manly installed to provide capacitive reactive compensation/ Power factor correction [7].

In this paper, voltage stability analysis of radial distribution networks under critical loading conditions with shunt capacitor banks has been carried out

II. BENEFITS OF SHUNT CAPACITOR BANK-SIMULATION RESULTS

12.66 kV radial distributed systems consisting of 33 nodes are taken for the analysis [8]. The single line diagram of the IEEE 33 bus system is shown in figure 1. large number of power systems as a major source of insecurity [2]. attention throughout the world and are now pointed in a By using shunt capacitors as a compensators, security and reliability of a voltage collapse phenomena have received an increasing distribution system can be improved through a given transmission line these shunt capacitive compensators improve the load carrying capability of the transmission due to which it experience many changes from low to high load problems every day [1]. constantly being faced with an ever-growing load demand controlling System data of IEEE 33 bus system are placed at Appendix-1. To find the impact of shunt capacitor banks in distribution network on voltage, losses and lines loading system. Following two cases are considered [9].
load flow studies have been carried with IEEE 33 bus

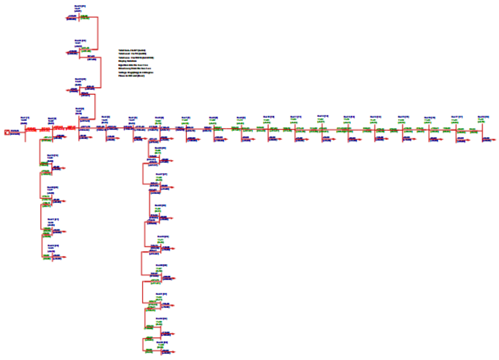

Fig. 1. 1-Line Diagram of IEEE 33 Bus Systems

Case 1 (without capacitor): no capacitor bank is used in 33 kV bus systems. Load flow study results are plotted at Fig-2.

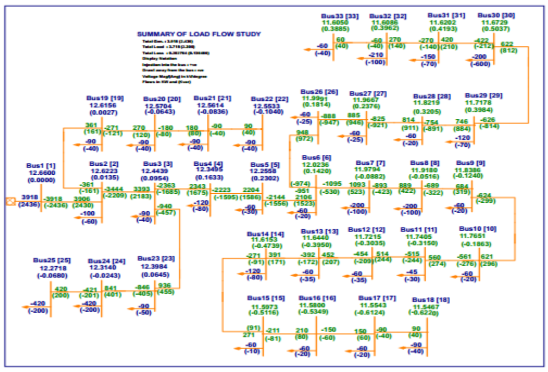

Fig. 2. LFS Plot Without Capacitor Banks at 33 kV Bus System

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Case 2 (with capacitor): shunt capacitor banks capacity equivalent to 75 % inductive load are connected to each bus. 1725 Kvar capacity shunt capacitor banks are placed in the network. Load flow study results for case 2 are placed at figure 3.

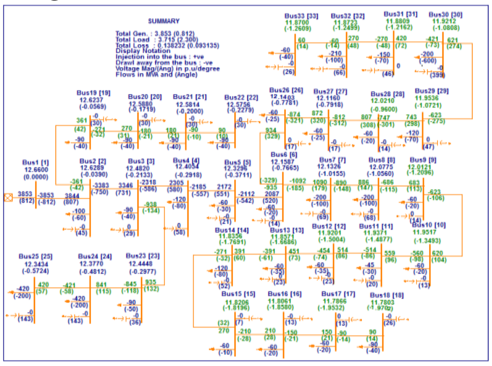

Fig. 3. LFS Plot with Capacitor Banks (75 % compensation) at 33 kV Bus System

Now impact of shunt capacitor banks on voltage, system losses and lines loading has been analyzed.

Impact on Voltage

Table 1 shows the impact on network voltage by use of shunt capacitor banks.

TABLE I
PARAMETER FOR BUS VOLTAGE

Bus no.	Voltage (kV) (Case 1)	Voltage (kV)(Case 2)
Bus1	12.6600	12.6600
Bus2	12.6223	12.6289
Bus3	12.4439	12.4820
Bus4	12.3495	12.4054
Bus5	12.2558	12.3296
Bus6	12.0236	12.1587
Bus7	11.9794	12.1326
Bus8	11.9180	12.0775
Bus9	11.8386	12.0121
Bus10	11.7651	11.9517
Bus11	11.7405	11.9371
Bus12	11.7215	11.9201
Bus13	11.6440	11.8571
Bus14	11.6153	11.8356
Bus15	11.5973	11.8206
Bus16	11.5800	11.8061
Bus17	11.5543	11.7866
Bus18	11.5467	11.7803
Bus19	12.6156	12.6237
Bus20	12.5704	12.5880
Bus21	12.5614	12.5814
Bus22	12.5533	12.5756
Bus23	12.3984	12.4448
Bus24	12.3140	12.3770
Bus25	12.2718	12.3434
Bus26	11.9991	12.1403
Bus27	11.9667	12.1160
Bus28	11.8219	12.0210
Bus29	11.7178	11.9536
Bus30	11.6729	11.9212
Bus31	11.6202	11.8809
Bus32	11.6086	11.8723
Bus33	11.6050	11.8700

Simulation studies indicate that distribution network voltage has been significantly increasing with the use of shunt capacitor banks. Voltage of some critical buses has been plotted in figure-4.

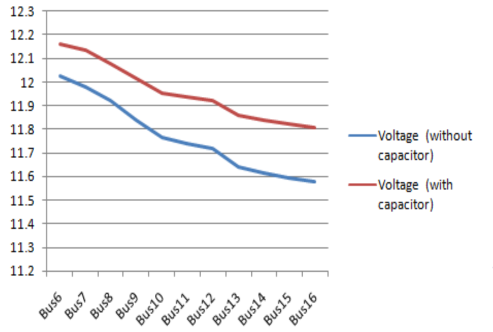

Fig. 4. Comparison of voltage with and without capacitor

Impact on Losses

Impact on kW and kVar losses is tabulated in following table.

TABLE II
IMPACT ON KW AND KVAR LOSSES

Particulars	Case 1	Case 2
Total system kW Losses	202.76	138.23
Total system kVAR Losses	136.48	93.13

Load flow studies indicate that with 75% inductive reactive power compensation, system losses are reduced from 202.76 kW to 138.23 kW. In case 2 distribution losses are reduced from 5.45 % to 3.72 % as compared to case1. Reactive power losses are also reduced from 136.48 MVAR to 93.13 MVAR.

Impact on lines loading

Lines loading are tabulated at table 3.

TABLE III
EFFECT ON LINE LOADING

Line	Line loading (KVA) (Case 1)	Line loading (KVA) (Case 2)
Bus1to2	4614	3886
Bus2to3	4092	3416
Bus3to4	2902	2351
Bus4to5	2736	2218
Bus5to6	2649	2146
Bus6to7	1217	1099
Bus7to8	989	896
Bus8to9	760	691
Bus9to10	692	627
Bus10to11	625	564
Bus11to12	570	518
Bus12to13	500	457
Bus13to14	428	394
Bus14to15	286	272
Bus15to16	225	212
Bus16to17	162	151

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Bus17to18	99	91
Bus2to19	395	362
Bus19to20	297	272
Bus20to21	197	181
Bus21to22	99	90
Bus3to23	1045	942
Bus23to24	938	849
Bus24to25	467	423
Bus6to26	1361	165
Bus26to27	1299	905
Bus27to28	1236	845
Bus28to29	1167	780
Bus29to30	1027	657
Bus30to31	472	425
Bus31to32	304	273
Bus32to33	72	61

Load flow studies indicate that with 75% inductive reactive power compensation, lines loading are significantly reduced.

III. Optimum Utilization of Shunt Capacitor Banks-Simulations Results

Output of shunt capacitor bank is squarely proportional to input voltage [10]. Therefore, swing bus voltage has been increased from 1 Pu to 1.05 Pu for optimum utilization of shunt capacitor banks in distribution network.

Case-3: Load flow results with swing bus voltage 1.05 Pu in Case 2 are plotted in figure 5

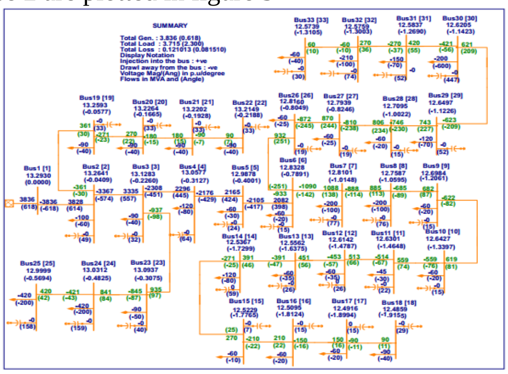

Fig. 5. LFS with swing bus voltage 1.05 Pu

Load flow study results of case 2 and case 3 are compared with respect to impact on voltage, losses and lines loading.

Impact on shunt capacitor banks output

TABLE IV

Particulars	Case 2	Case 3
Total output of Shunt capacitor banks (Kvar)	1582(91.7%)	1763(102.2%)

With the increase of swing bus voltage from 1 p.u to 1.05 p.u output of shunt capacitor banks are increased from 1582 to 1763 Kvar in case 3 as compared to case 2. Capacity utilization factor has been increased from 91.7 % to 102.2 %.

Impact on Voltage

Table 5 shows the impact on voltage by considering with capacitor and swing bus voltage 1.05 Pu.

TABLE V
PARAMETER FOR BUS VOLTAGE

Bus no	Voltage (kV) (case 2)	Voltage (kV) (case 3)
Bus1	12.6600	13.2930
Bus2	12.6289	13.2641
Bus3	12.4820	13.1283
Bus4	12.4054	130577
Bus5	12.3296	12.9878
Bus6	12.1587	12.8328
Bus7	12.1326	12.8101
Bus8	12.0775	12.7587
Bus9	12.0121	12.6984
Bus10	11.9517	12.6427
Bus11	11.9371	12.6301
Bus12	11.9201	12.6142
Bus13	11.8571	12.5562
Bus14	11.8356	12.5361
Bus15	11.8206	12.5229
Bus16	11.8061	12.5095
Bus17	11.7866	12.4916
Bus18	11.7803	12.4859
Bus19	12.6237	13.2593
Bus20	12.5880	13.2264
Bus21	12.5814	13.2202
Bus 22	12.5756	13.2149
Bus23	12.4448	13.0937
Bus24	12.3770	13.0312
Bus25	12.3434	12.9999
Bus26	12.1403	12.8160
Bus27	12.1160	12.7939
Bus28	12.0210	12.7095
Bus29	11.9536	12.6497
Bus30	11.9212	12.6205
Bus31	11.8809	12.5837
Bus32	11.8723	12.5759
Bus33	11.8700	12.5739

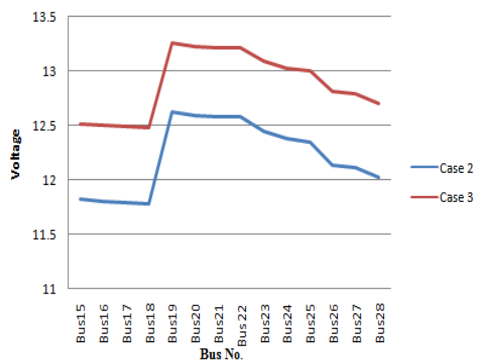

Fig. 6. Effect of swing bus voltage on 33 kV network

Figure 6 shows the plot of impact increase of swing bus voltage on network voltage and from the load flow study it is concluded with shunt capacitor banks, voltage of 33 kV buses has been increased significantly as seen in above graph [11].

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Impact on Losses

TABLE VI

Particulars	Case 2	Case 3
Total system kW Losses	138.23	121.01
Total system kVAR Losses	93.13	81.51

With the increase of swing bus voltage from 1 p.u to 1.05 p.u system losses are decreased from 138.23 kW to 121.01 kW. In case 3 distribution losses are reduced from 3.72% to 3.26% as compared to case2. Kvar losses are decreased by 93.13 kvar to 81.51 kvar.

Impact on Lines Loading

Lines loading are tabulated at table 7.

TABLE VII
EFFECT ON LINE LOADING (KVA)

Line bus to bus	Case2	Case3
Bus1to2	4100	4039
Bus2to3	3617	3560
Bus3to4	2518	2472
Bus4to5	2374	2332
Bus5to6	2297	2258
Bus6to7	1133	1124
Bus7to8	923	915
Bus8to9	711	706
Bus9to10	646	641
Bus10to11	582	578
Bus11to12	533	529
Bus12to13	469	466
Bus13to14	404	401
Bus14to15	276	275
Bus15to16	216	215
Bus16to17	154	154
Bus17to18	93	92
Bus2to19	370	368
Bus19to20	278	276
Bus20to21	185	184
Bus21to22	92	92
Bus3to23	969	962
Bus23to24	872	867
Bus24to25	434	432
Bus6to26	1087	1059
Bus26to27	1027	999
Bus27to28	967	939
Bus28to29	901	875
Bus29to30	775	749
Bus30to31	438	435
Bus31to32	282	280
Bus32to33	64	63

Lines loading are reduced in case 3 as compared to case2.

IV. EFFECT OF SHUNT CAPACITOR BANKS ON VOLTAGE STABILITY-SIMULATION RESULTS

System load has been increased from 1pu to 2 Pu in case 1 and case2. Effect on system losses are tabulated at table 8.

TABLE VIII
IMPACT ON LOSSES

System losses	Case 1		Case 2	
	Total system kW Losses	Total system kVAR Losses	Total system kW Losses	Total system kVAR Losses
1 pu	0.202764	0.136486	0.153022	0.103090
1.2 pu	0.301626	0.203151	0.237424	0.160034
1.4 pu	0.424966	0.286402	0.345555	0.233051
1.6 pu	0.575892	0.388379	0.480360	0.324169
1.8 pu	0.758284	0.511757	0.645498	0.435912
2.0 pu	0.977095	0.659958	0.845614	0.571485

Increase of system losses with the increase of system load are less in case 2 as compared to case 1.

TABLE IX
EFFECT ON VOLTAGE STABILITY

System Load	kW	3715	4458	5201	5944	6687	430
	PU	1	1.2	1.4	1.6	1.8	2
Bus2	Case 1	0.9965	0.9964	0.9957	0.9950	0.9943	0.9936
	Case 2	0.9974	0.9967	0.9961	0.9954	0.9947	0.9940
Bus3	Case 1	0.9829	0.9792	0.9754	0.9715	0.9674	0.9631
	Case 2	0.9850	0.9813	0.9775	0.9736	0.9695	0.9652
Bus6	Case 1	0.9497	0.9387	0.9272	0.9153	0.9027	0.8896
	Case 2	0.9569	0.9459	0.9344	0.9226	0.9101	0.8971
Bus18	Case 1	0.9121	0.8926	0.8722	0.8510	0.8286	0.8050
	Case 2	0.9244	0.9049	0.8847	0.8635	0.8413	0.8179
Bus22	Case 1	0.9916	0.9898	0.9881	0.9863	0.9845	0.9826
	Case 2	0.9927	0.9910	0.9892	0.9875	0.9856	0.9838
Bus25	Case 1	0.9693	0.9628	0.9561	0.9493	0.9422	0.9349
	Case 2	0.9731	0.9666	0.9600	0.9531	0.9461	0.9389
Bus33	Case 1	0. 9167	0.8982	0.8790	0.8589	0.8379	0.8156
	Case 2	0.9306	0.9122	0.8931	0.8731	0.8522	0.8301

Bus voltage of case 1 and case 2 for different network loadings are tabulated at table 9.
As per simulation, decrease in bus voltages in case 2 is less as compared to case 1 [12].

V. CONCLUSION

In this paper, benefit of shunt capacitor banks in distribution network has been studied on IEEE 33 bus system. As per simulations system losses are reducing, network voltage increase and lines loading decrease with shunt capacitor banks in network. Impact of swing bus voltage on capacity utilization of installed shunt capacitor banks is also simulated. As per studies capacity utilization of shunt capacitor banks increased with increase of swing bus voltage. In this paper voltage stability of radial distribution network with and without considering shunt

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capacitor has been studied under the critical loading conditions. Decrease in network voltage with shunt capacitor banks is less.

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BIOGRAPHY

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Prof. A. K. Pathak has carried out his B.E (Electrical Engineering) Degree in 1 972 and MSc .Engineering (PS) in 1982. He has joined R.S.E.B, in 1 973 as Assistant Engineer and retired as Chief Engineer (PPM, Fuel &H&GP) in 2010.He also remains as Executive Director in Rajasthan Renewable Energy Corporation Jaipur. He joined as Professor in Rajasthan Institute of Engineering & Technology, Jaipur in 2010 & presently working as Dean Academic in Rajasthan College of Engineering for Women Jaipur. He involved in 400 KV System & Line Design, Renewable Energy. He worked in different capacities in Thermal, Gas, Combined Cycle Power Plants, Hydro, Solar and Wind Power plants. He also worked in Beas Construction Board & Bhakhra Beas Management Board. He is carrying out research work in renewable energy areas. He is Ph.D Scholar in Poornima University, Jaipur Electrical Engineering field.

Appendix

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1	Bus1	1	1	3	1.0000	0.00	0.00	0.00	3.92	2.44	12.660	1.000	600.000	0.000	0.00	0.00	0
2	Bus2	1	1	0	0.9970	0.01	-0.10	-0.06	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
3	Bus3	1	1	0	0.9829	0.10	-0.09	-0.04	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
4	Bus4	1	1	0	0.9755	0.16	-0.12	-0.08	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
5	Bus5	1	1	0	0.9681	0.23	-0.06	-0.03	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
6	Bus6	1	1	0	0.9497	0.14	-0.06	-0.02	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
7	Bus7	1	1	0	0.9462	-0.09	-0.20	-0.10	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
9	Bus9	1	1	0	0.9351	-0.12	-0.06	-0.02	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
10	Bus10	1	1	0	0.9293	-0.19	-0.06	-0.02	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
11	Bus11	1	1	0	0.9274	-0.31	-0.05	-0.03	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
12	Bus12	1	1	0	0.9259	-0.30	-0.06	-0.04	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
13	Bus13	1	1	0	0.9197	-0.39	-0.06	-0.04	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
14	Bus14	1	1	0	0.9175	-0.47	-0.12	-0.08	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
5	Bus15	1	1	0	0.9161	-0.51	-0.06	-0.01	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
16	Bus16	1	1	0	0.9147	-0.53	-0.06	-0.02	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
17	Bus17	1	1	0	0.9127	-0.61	-0.06	-0.02	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
18	Bus18	1	1	0	0.9121	-0.62	0.09	-0.04	0.00	0.00	12.66	1.000	0.000	0.000	0.00	0.00	0

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19	Bus19	1	1	0	0.9965	0.00	-0.09	-0.04	0.00	0.00	12.66	1.000	0.000	0.000	0.00	0.00	0
20	Bus20	1	1	0	0.9929	-0.06	-0.09	-0.04	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
21	Bus21	1	1	0	0.9922	-0.08	-0.09	-0.04	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
22	Bus22	1	1	0	0.9916	-0.10	-0.09	-0.04	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
23	Bus23	1	1	0	0.9793	0.06	-0.09	-0.05	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
24	Bus24	1	1	0	0.9727	-0.02	-0.42	-0.20	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
25	Bus25	1	1	0	0.9693	-0.07	-0.42	-0.20	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
26	Bus26	1	1	0	0.9478	0.18	-0.06	-0.03	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
27	Bus27	1	1	0	0.9452	0.24	-0.06	-0.03	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
28	Bus28	1	1	0	0.9338	0.32	-0.06	-0.02	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
29	Bus29	1	1	0	0.9256	0.40	-0.12	-0.07	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
30	Bus30	1	1	0	0.9220	0.50	-0.20	-0.60	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
31	Bus31	1	1	0	0.9179	0.42	-0.15	-0.07	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
32	Bus32	1	1	0	0.9169	0.40	-0.21	-0.10	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0
33	Bus33	1	1	0	0.9167	0.39	-0.06	-0.04	0.00	0.00	12.660	1.000	0.000	0.000	0.00	0.00	0

BUS DATA FOLLOW

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BRANCH DATA FOLLOWS

1	2	1	1	1	0	0.05753	0.02976	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
2	3	1	1	1	0	0.30760	0.15661	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
3	4	1	1	1	0	0.22836	0.11480	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
4	5	1	1	1	0	0.23778	0.12110	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
5	6	1	1	1	0	0.51099	0.43675	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
6	7	1	1	1	0	0.11680	0.38608	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
7	8	1	1	1	0	0.44386	0.14668	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
8	9	1	1	1	0	0.64264	0.46170	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
9	10	1	1	1	0	0.64888	0.46170	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
10	11	1	1	1	0	0.12266	0.40555	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
11	12	1	1	1	0	0.23360	0.07724	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
12	13	1	1	1	0	0.91592	0.72063	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
13	14	1	1	1	0	0.33792	0.44480	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
14	15	1	1	1	0	0.36874	0.32818	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
15	16	1	1	1	0	0.46564	0.34004	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
16	17	1	1	1	0	0.80424	1.07378	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
17	18	1	1	1	0	0.45671	0.35813	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
2	19	1	1	1	0	0.10232	0.09764	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
19	20	1	1	1	0	0.93851	0.84567	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
20	21	1	1	1	0	0.25550	0.29849	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
21	22	1	1	1	0	0.44230	0.58481	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
3	23	1	1	1	0	0.28152	0.19236	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
23	24	1	1	1	0	0.56028	0.44243	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
24	25	1	1	1	0	0.55904	0.43743	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
6	26	1	1	1	0	0.12666	0.06451	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
26	27	1	1	1	0	0.17732	0.09028	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
27	28	1	1	1	0	0.66074	0.58256	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
28	29	1	1	1	0	0.50176	0.43712	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
29	30	1	1	1	0	0.31664	0.16128	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
30	31	1	1	1	0	0.60795	0.60084	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
31	32	1	1	1	0	0.19373	0.22580	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00
32	33	1	1	1	0	0.21276	0.33081	0.00004192	4192	4192	0	0	0.000	0.00	0.000	0.000	0.0000	0.00	0.00

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LOSS ZONES FOLLOW

1 LOSS Zone Name

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